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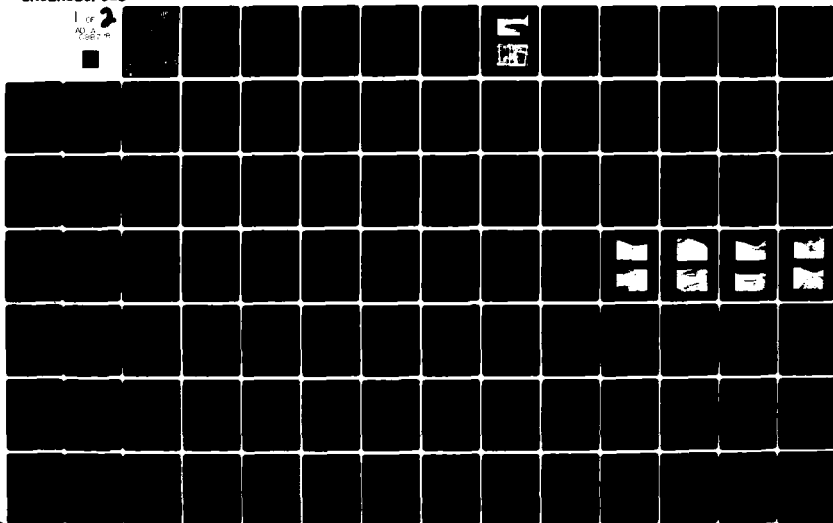
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OHIO RIVER BASIN

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UNNAMED TRIBUTARY TO HARMON CREEK, WASHINGTON COUNTY
PENNSYLVANIA

PA 485

NDI No. PA 01123

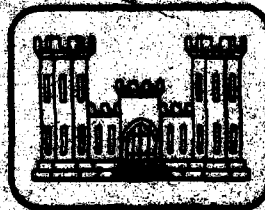
PennDER No. 63-81

SCS No. PA 485

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PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM



prepared for

DEPARTMENT OF THE ARMY

Baltimore District, Corps of Engineers

Baltimore, Maryland 21203

prepared by

MICHAEL BAKER, JR., INC.

Consulting Engineers

4301 Dutch Ridge Road

Beaver, Pennsylvania 15009

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OHIO RIVER BASIN

PA-485
WASHINGTON COUNTY, COMMONWEALTH OF PENNSYLVANIA
NDI No. PA 01123
PennDER No. 63-81
SCS No. PA 485

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Unnamed Tributary to Harmon Creek,
NDI No. PA 01123
Situated on the left bank of Harmon Creek, Washington
County, Pennsylvania. Phase I Inspection Report,

Prepared for: DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

Prepared by: MICHAEL BAKER, JR., INC.
Consulting Engineers
4301 Dutch Ridge Road
Beaver, Pennsylvania 15009

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PREFACE

This report is prepared under guidance contained in the "Recommended Guidelines for Safety Inspection of Dams," for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I Inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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PHASE I REPORT
NATIONAL DAM INSPECTION PROGRAM

PA 485, Washington County, Pennsylvania
NDI No. 01123, PennDER No. 63-81, SCS No. PA 485
Unnamed Tributary to Harmon Creek
Inspected 20 March 1980

ASSESSMENT OF
GENERAL CONDITIONS

PA 485 is classified as an "Intermediate" size - "High" hazard dam. The dam, owned by the Washington County Commissioners, is used to reduce floodwater damages in the Harmon Creek Watershed. The dam and appurtenant structures were found to be in good condition at the time of the inspection.

Hydrologic/hydraulic evaluations, performed in accordance with procedures established by the Baltimore District, U.S. Army Corps of Engineers, for Phase I Inspection Reports, revealed that the spillway will pass the Probable Maximum Flood (PMF) without overtopping the dam. A spillway design flood (SDF) equal to the PMF is required for PA 485. The spillway is therefore considered to be "adequate".

The visual inspection revealed several minor deficiencies which require remedial action by the owners of the dam:

- 1) Remove the debris which has collected in the trash rack in front of the low-level intake on the riser unit.
- 2) Repair the minor tire rutting along the crest of the dam. Vehicles should be prevented from traveling along the dam crest.
- 3) Reseed the areas along the dam crest and the berm on the upstream face of the dam where vegetation is sparse.
- 4) Repair the erosion gully on the downstream side of the dam along the junction of the embankment and right abutment.
- 5) Regrade the berms on the downstream face of the embankment to provide better surface drainage.

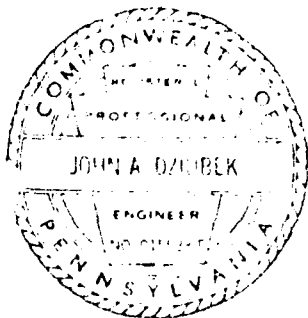
It is also recommended that the slide in the left abutment immediately upstream from the emergency spillway be monitored during future inspections to ensure that this does not become a significant problem.

In addition, the following operational measures are recommended to be undertaken by the owner:

- 1) Develop a detailed emergency operation and warning system.
- 2) During periods of unusually heavy rainfall, provide around-the-clock surveillance of the dam.
- 3) When warning of a storm of major proportions is given by the National Weather Service, the owner should activate the emergency operation and warning system.

Submitted by:

MICHAEL BAKER, JR., INC.



John A. Dziubek
John A. Dziubek, P.E.
Engineering Manager-Geotechnical

Date: 10 July 1980

Approved by:

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS

James W. Peck
JAMES W. PECK
Colonel, Corps of Engineers
District Engineer

Date: 11 August 80

PA 485



Overall View of Upstream Face of Dam from Reservoir Area



Overall View of Crest of Dam and Downstream Face from Right Abutment

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PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
PA 485

NDI No. PA 01123, PennDER No. 63-81, SCS No. PA 485

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

- a. Authority - The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspection of dams throughout the United States.
- b. Purpose of Inspection - The purpose of inspection is to determine if the dam constitutes a hazard to human life or property.

1.2 DESCRIPTION OF PROJECT

- a. Description of Dam and Appurtenances - PA 485 is a zoned earthfill embankment with a total length of 630 feet, including the emergency spillway on the left abutment. The minimum top of dam elevation is 931.8 feet Mean Sea Level (M.S.L.). The height and crest width of the embankment are 78 feet and 14 feet, respectively. The upstream face of the embankment has a slope of 3H:1V (Horizontal to Vertical) with a 40 foot wide bench located between Elevation 880.3 feet M.S.L. and Elevation 884.3 feet M.S.L. The downstream face of the embankment has a slope of 2.5H:1V. There are two benches on the downstream face; the first is 10 feet wide and is located between Elevation 895.0 feet M.S.L. and Elevation 896.0 feet M.S.L.; the second is 20 feet wide and lies between Elevation 883.0 feet M.S.L. and 885.0 feet M.S.L.¹

The embankment was constructed using three zones of fill material. The inner core of the dam, zone I, consists of fine-grained, relatively impervious material. The core section has 1.5H:1V side slopes to Elevation 917.7 feet M.S.L. Above this point, the core extends vertically to within 5 feet of the crest of the dam. The width of this vertical section is 14 feet. The outer shell of

¹The two benches on the downstream side of the embankment have a 1 percent slope down towards the right abutment. Elevations listed above correspond to the elevations of the benches at Stations 3+12 on the top of dam profile included in Appendix A.

the embankment, zone II, was constructed using weathered siltstone and silty sand. Additional fill, zone III, was placed at the upstream and downstream toe of the embankment. This material consists of crushed rock excavated from the emergency spillway, cut-off trench, principal spillway, and left abutment.

A cut-off trench with a minimum depth of 3 feet, side slopes of 2H:1V, and a bottom width ranging from 12 feet to 22 feet extends under the entire length of the embankment. Zone I material was used to backfill the cut-off trench.

The drainage system for the dam has four components: (1) a foundation drain, (2) a chimney drain, (3) a rock face blanket drain, and (4) an outlet blanket drain. The foundation drain consists of a 12 inch perforated drain pipe and graded drain fill. It extends from the base of the left abutment to normal pool level on the right abutment. The chimney drain is located on the downstream side of the embankment between the zone I and zone II fills. This drain material is 10 feet thick. It does not cover the full length of the embankment, rather, it is divided into two sections which extend approximately 75 feet out from each abutment. The chimney drain outlets into the foundation drain. Drainage for the left abutment is provided by a rock face blanket drain which consists of a blanket of coarse aggregate approximately 8.5 feet thick. This drain outlets into the outlet blanket drain which extends from the junction of the chimney drain and the base of the left abutment to the downstream toe of the embankment.

Rock gutters have been placed at the junctions of the embankment and abutments to provide surface drainage.

The principal spillway is a drop-inlet structure consisting of a two stage reinforced concrete riser connected to a 30 inch diameter reinforced concrete outlet pipe. The low-level inlet on the riser unit is a 1.5 foot wide by 1.0 foot high orifice with an invert elevation of 879.5 feet M.S.L. This orifice maintains the normal pool level at Elevation 879.5 feet M.S.L. The upper-level inlet consists of two concrete overflow weirs with rounded downstream edges. The weirs are located on either side of the riser unit. Each is 7.5 feet long and has a crest elevation of

895.5 feet M.S.L. There is a rectangular opening 7.5 feet wide and 1.25 feet high above each weir. The openings to the low-level and upper-level inlets are protected by metal trash racks.

The outlet pipe from the riser unit is 484 feet long and has 15 concrete anti-seep collars. The pipe exits into a concrete impact basin at the downstream toe of the embankment.

The reservoir drain consists of a trapezoidal channel leading from the reservoir area to a 30 inch diameter opening at the base of the riser unit. The channel is 3.5 feet deep, 30.6 feet wide, and has 1H:1V side slopes. The invert elevation of the drain opening at the base of the riser unit is 855.5 feet M.S.L. The reservoir can be drawn down by opening the 30 inch gate valve which covers this opening. The controls for the gate valve are located on the top of the riser unit.

The emergency spillway for the dam is located at the left abutment. It consists of a vegetated trapezoidal channel with a bottom width of 50 feet and 2H:1V side slopes. The spillway was designed as an earth and rock cut in the left abutment of the dam. The control section in the spillway, located approximately along the centerline of the crest of the dam, is at Elevation 917.7 feet M.S.L. Downstream from the emergency spillway is a 5 foot high protection dike (see Plates 3 and 5 for details).

- b. Location - PA 485 is located on an unnamed tributary to Harmon Creek, 175 feet north of Township Route T-819 in Washington County, Pennsylvania. The dam is approximately 1.5 miles northwest of Eldersville, Pennsylvania. The dam and reservoir can be found on the Steubenville East, West Virginia-Pennsylvania-Ohio 7.5 minute USGS topographic quadrangle.
- c. Size Classification - The dam is 78 feet high and has a storage capacity of 951.8 acre-feet. The dam is therefore in the "Intermediate" size category.
- d. Hazard Classification - There are two homes located immediately downstream from the dam. Loss of life in these structures during a dam failure is believed likely to occur. The dam is therefore in the "High" hazard category.

- e. Ownership - The dam is owned by the Washington County Commissioners, Washington County Courthouse, Washington, Pennsylvania.
- f. Purpose of Dam - PA 485 is one of several floodwater retarding dams constructed by the U.S. Department of Agriculture, Soil Conservation Service (SCS) in the Harmon Creek Watershed. Its purpose is to reduce floodwater damages in the downstream areas of the watershed.
- g. Design and Construction History - The dam was designed by the SCS in 1975. Construction was begun in April 1976 and completed in October 1977. The contractor responsible for construction of the dam was Solomon-Teslovich of Masontown, Pennsylvania.
- h. Normal Operating Procedures - The reservoir level is typically maintained by the low-level inlet on the riser unit at Elevation 879.5 feet M.S.L. Washington County and SCS personnel inspect the dam each year according to the procedures for annual inspections of SCS dams of this type.

1.3 PERTINENT DATA

- a. Drainage Area (square miles) - 2.18
- b. Discharge at Dam Site (c.f.s.) -
 - Peak Outflow at -
 - Crest of Riser (El. 895.5 ft. M.S.L.) - 28.5
 - Crest of Emergency Spillway (El. 917.7 ft. M.S.L.) - 132
 - Design High Water (El. 920.9 ft. M.S.L.) - 825
 - Top of Dam (El. 931.2 ft. M.S.L.) - 8693
 - Maximum Known Non-Damaging Discharge - 120
- c. Elevation (feet above M.S.L.) -
 - Design Top of Dam - 931.2
 - Design High Water - 920.9
 - Crest of Emergency Spillway - 917.7
 - Crest of Upper-Level Inlet - 895.5
 - Invert of Low-Level Inlet - 879.5
 - Normal (Sediment) Pool - 879.5
 - Streambed at Downstream Toe - 853+

d. Reservoir (feet) -

Length of Normal Pool (El. 879.5 ft. M.S.L.) -	1800
Length of Maximum Pool (El. 931.2 ft. M.S.L.) -	5350

e. Storage (acre-feet) -

Normal Pool (El. 879.5 ft. M.S.L.) -	43.5 ²
Crest of Emergency Spillway (El. 917.7 ft. M.S.L.) -	536.8
Design High Water (El. 920.9 ft. M.S.L.) -	621.8
Top of Dam (El. 931.2 ft. M.S.L.) -	951.8

f. Reservoir Surface (acres) -

Normal Pool (El. 879.5 ft. M.S.L.) -	5.7
Crest of Emergency Spillway (El. 917.7 ft. M.S.L.) -	25.5
Design High Water (El. 920.9 ft. M.S.L.) -	27.7
Top of Dam (El. 931.2 ft. M.S.L.) -	37.0

g. Dam -

Type - Zoned earthfill embankment

Length (feet) -	630
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Height (feet) -	78
-----------------	----

Crest Width (feet) -	14
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Slopes - Upstream - 3H:1V with a 40 foot wide bench between El. 880.3 ft. and 884.3 ft. M.S.L.

Downstream - 2.5H:1V with a 10 foot wide bench between El. 895.0 ft. and 896.0 ft M.S.L. and a 20 foot wide bench between El. 883.0 ft. and 885.0 ft. M.S.L.

Zoning - The embankment was constructed using three zones of fill material. The fine-grained, impervious inner core, zone I, has 1.5H:1V side slopes to El. 917.7 ft. M.S.L. Above this point, the core extends vertically to within 5 feet of the crest of the dam. The outer shell of the embankment, zone II, was constructed using weathered siltstone and silty sand. Additional fill, zone III, consisting of crushed rock from the various excavations, was placed at the upstream and downstream toe of the embankment (see Plate 5 for details).

²This volume is reserved for a 50-year accumulation of sediment. It is not included in floodwater storage calculations.

Cut-off - There is a cut-off trench with a minimum depth of 3 feet, side slopes of 2H:1V, and a bottom width ranging from 12 feet to 22 feet along the centerline of the embankment.

Drains - A foundation drain, a chimney drain, a rock face blanket drain at the left abutment, and an outlet blanket drain have been included in the dam.

Grout Curtain - None

h. Diversion and Regulatory Tunnel - None

i. Spillway (Emergency Spillway) -

Type - Vegetated trapezoidal earth and rock cut channel at the left abutment

Length Along Centerline (feet) - 440

Bottom Width (feet) - 50

Side Slopes - 2H:1V

Crest Elevation (feet M.S.L.) - 917.7

j. Regulatory Outlets (Principal Spillway) - The principal spillway is a standard SCS two stage covered riser unit. The low-level inlet is a 1.5 foot wide by 1.0 foot high orifice with an invert elevation of 879.5 ft. M.S.L. The upper-level inlet consists of two concrete overflow weirs with a total weir length of 15 feet. The crest of the upper-level inlet is at El. 895.5 ft. M.S.L.

The outlet pipe from the riser unit is a 30 inch diameter reinforced concrete pipe 484 feet long. This pipe exits into a concrete impact basin at the downstream toe of the embankment.

The reservoir drain consists of a 30 inch diameter opening at the base of the riser unit (invert El. 855.5 ft. M.S.L.). The drain is controlled by a 30 inch gate valve operated from the top of the riser unit.

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

PA 485 was designed as a single purpose floodwater retarding structure. It is one of several flood control dams constructed by the SCS in the Harmon Creek Watershed to reduce flood damages in the lower reaches of the basin. The dam was designed to retard the 100-year frequency storm without discharge occurring in the emergency spillway.

PA 485 was designed by the SCS according to its standard procedures for structures of this type. Design data reviewed for this report included the following:

- 1) SCS Drawings No. PA-485-P, "Harmon Creek Watershed Project, Brooke and Hancock Counties, West Virginia, Washington County, Pennsylvania, Floodwater Retarding Dam PA-485," 52 sheets "as built" 12 October 1977.
- 2) "Design Report, Site PA-485, Pennsylvania," U.S. Department of Agriculture, Soil Conservation Service, undated (copy obtained from Harrisburg office of the SCS).
- 3) Inspection reports filed by the Pennsylvania Department of Environmental Resources' (PennDER) personnel during construction of the dam (from 16 April 1976 to 17 October 1977).
- 4) The permit application and various pieces of correspondence contained in the PennDER file on the dam.
- 5) The "Erosion and Sediment Control Plan" prepared by the SCS office in Washington, Pennsylvania for this dam.

2.2 CONSTRUCTION

The construction of PA 485 was performed by Solomon-Teslovich of Masontown, Pennsylvania. Construction was begun in April 1976 and completed in October 1977. No mention of significant problems during construction is made in any of the available information.

2.3 OPERATION

The reservoir level is typically maintained by the low-level inlet of the riser unit at Elevation 879.5 feet M.S.L. Washington County and SCS personnel inspect the dam each year according to the procedures for annual inspections of SCS dams of this type.

2.4 EVALUATION

- a. Availability - The information reviewed is readily available from the PennDER file on the dam and from the SCS office in Harrisburg, Pennsylvania.
- b. Adequacy - The information available is adequate for a Phase I Inspection of this dam.
- c. Validity - There is no reason at the present time to question the validity of the available information.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

- a. General - The visual inspection was performed on 20 March 1980. No unusual weather conditions were experienced and the reservoir was 2.8 feet above normal pool. The dam and appurtenances were found to be in good condition at the time of the inspection. Noteworthy observations made during the visual inspection are described in the following paragraphs. The complete visual inspection check list, field sketch³, top of dam profile, and typical cross-section are presented in Appendix A.
- b. Dam - The following is a list of the minor deficiencies observed during the visual inspection of the embankment and abutments.
 - 1) There is some minor tire rutting along the crest of the embankment from vehicles being driven over the dam. Measures should be taken to prevent vehicles from driving on the embankment.
 - 2) Vegetation is relatively sparse in several areas on the dam crest and on the berm on the upstream face of the embankment. These areas should be reseeded.
 - 3) There is a small slide on the left abutment upstream of the emergency spillway. This slide does not represent a significant problem to the embankment or the emergency spillway at the present time.
 - 4) Some water has collected on the berms on the downstream face of the dam. These areas are above the reservoir level which indicates that the water is probably the result of recent precipitation and not seepage through the embankment.

³Stationing on the field sketch prepared for this report is different than that shown on SCS design plans included as plates in Appendix E. Any references made to stationing in this report refer to the stations shown on the field sketch and not those on the SCS design drawings.

(Note: During the field review a small mud slide was observed on the left abutment adjacent to the downstream rock gutter approximately 30 feet downstream from the crest. This slide does not affect the structural stability but may clog the rock gutter with soil.)

- 5) A small erosion gully has developed on the downstream side of the dam along the junction of the embankment and right abutment.

- c. Appurtenant Structures - A small amount of debris has collected in the trash rack protecting the low-level inlet. A small amount of water has collected in the upstream section of the emergency spillway. This water is probably the result of recent precipitation. No other problems in the appurtenant structures were observed.
- d. Reservoir Area - The reservoir slopes are primarily forested and relatively steep. The small slide mentioned in Section 3.1.b., item 3 was the only evidence of slope instability observed during the inspection.

The dam was designed with a sediment storage capacity equivalent to 50-years of sediment accumulation. There was no indication that sedimentation was occurring at a rate faster than that anticipated by the SCS in the design of this dam.

- e. Downstream Channel - A board approximately 1.0 foot high has been placed across the bottom of the outlet channel approximately 150 feet downstream from the impact basin. A fence also crosses over the channel at this point. Debris collecting in the fence and the board combine to back up water in the outlet channel, forming a small pool approximately 2 feet deep. It appears that this pool was created to provide an area for geese. The backwater from this pool reaches the impact basin but does not represent a significant restriction to flow out of the outlet channel.

The outlet channel passes under Township Route T-819 approximately 175 feet downstream from the impact basin. Flow is carried under this road by an opening 5 feet high by 20 feet long. Immediately downstream from this road are two residential structures. The next structures are located approximately 2000 feet further downstream on Harmon Creek.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

The dam and appurtenances are inspected by Washington County and SCS personnel each year according to the procedures for annual inspections of SCS dams of this type. Formal maintenance and inspection procedures are presented in the "Erosion and Sediment Control Plan" for this dam.

4.2 MAINTENANCE OF DAM AND APPURTENANCES

Routine maintenance is performed periodically by Washington County personnel. Formal maintenance procedures are described in the "Erosion and Sediment Control Plan" for this dam. At the present time, maintenance of the dam and appurtenances is considered to be adequate.

4.3 DESCRIPTION OF ANY WARNING SYSTEM IN EFFECT

An emergency warning procedure is being developed for PA 485. However, at the present time, no formal procedure is in effect.

4.4 EVALUATION OF OPERATIONAL ADEQUACY

The present operational and maintenance procedures for the dam are considered to be adequate. Formal emergency warning procedures should be developed and implemented.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES

- a. Design Data - Hydrologic and hydraulic design calculations for PA 485 were obtained from the SCS design report for this dam. The dam was built as part of a system to reduce floodwater damages in the downstream reaches of the Harmon Creek Watershed. It was designed to retard the 100-year frequency storm without discharge occurring in the emergency spillway. A sediment storage volume equivalent to a 50-year accumulation of sediment has been provided.

The elevations of the design high water level and the top of dam were determined by routing the emergency spillway and freeboard hydrographs developed by the SCS through the reservoir. Both hydrographs were based on a storm duration of 6 hours. A summary of rainfall, hydrograph, and routing data used by the SCS is presented in Appendix D.

- b. Experience Data - Washington County personnel reported that the emergency spillway has never been activated on this dam. The maximum pool level of record is approximately at Elevation 905.4 feet M.S.L., 15.5 feet below the crest of the emergency spillway. This level was reached sometime in the summer of 1978 when local residents blocked the intakes on the riser unit. Washington County personnel did not become aware of this situation until the pool level had reached the elevation stated above, at which time the blockage was removed and the reservoir level lowered. No problems were reported to have arisen from this high pool level.
- c. Visual Observations - No conditions were observed during the visual inspection which would indicate that the dam and appurtenances could not perform satisfactory during a flood event.
- d. Overtopping Potential - PA 485 is an "Intermediate" size - "High" hazard dam requiring evaluation for a spillway design flood (SDF) equal to the Probable Maximum Flood (PMF). Since the dam was designed by the SCS using precipitation values approximately equal to the Probable Maximum Precipitation, the dam should be capable of safely passing the SDF without overtopping. After reviewing the

hydrologic and hydraulic calculations prepared by the SCS and judging them to be accurate, it was determined that further hydrologic or hydraulic analyses were unnecessary.

- e. Spillway Adequacy - The dam and appurtenances, as outlined above, were designed to safely pass a freeboard hydrograph approximately equal to the PMF. Therefore, the spillway is considered to be "adequate".

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

- a. Visual Observation - No structural inadequacies were noted during the visual inspection of PA 485. The small slide in the left abutment upstream from the emergency spillway does not affect the embankment at this time. This area should be monitored in future inspections to ensure that it does not develop into a significant problem.
- b. Design and Construction Data - Calculations of embankment slope and foundation stability were not available for review. However, summary reports from the SCS Soil Mechanics Laboratory at Lincoln, Nebraska dated 13 November 1974, 13 June 1972, 21 March 1972, and 23 September 1971 presented the results of the laboratory soil testing program and slope stability analysis performed. Total stress shear strength parameters obtained and used in the slope stability analysis were reported as follows:

Foundation Materials -

Soil Type -	Sandy Clay (CL) and Clayey Gravel (GC)
Type of Test Performed -	Direct Shear Test
Angle of Internal Friction (ϕ) -	30.5°
Cohesion (c) -	0
Sample Type -	Remolded*

*(Note: A Shelby tube sample was obtained for testing; however, because of the gravel, a small diameter undisturbed test sample could not be adequately trimmed. Remolded and compacted samples were then prepared for testing.)

Zone I (core) Embankment Materials -

Soil Type -	Silts and Clays (ML, MH, CL)
Type of Test Performed -	Consolidated Undrained Triaxial Shear Test
Angle of Internal Friction (ϕ) -	15.5°
Cohesion (c) -	450 p.s.f.
Sample Type -	Minus No. 4 Sieve, Remolded and Compacted at 100% Standard Proctor

Zone II (shell) Embankment Materials -

Soil Type -	Weathered Siltstone (GM)
Type of Test Performed -	Consolidated Undrained Triaxial Shear Test
Angle of Internal Friction (ϕ) -	15.5°
Cohesion (c) -	750 p.s.f.
Sample Type -	Mixture of 40% minus No. 4 material and 60% rock, compacted to 85% of Standard Proctor*

*(Note: A method specification was used for construction of the shell material - "minimum 6 passes with a 450 p.s.i. tamping roller per lift.")

Zone III embankment material shear strength is the same as zone II material. Additional testing of the strip mine spoil placed on the borrow area showed the shear strength exceeded the strength parameters presented above.

The results of the stability calculations (using a Modified Swedish Circle Method) for various embankment designs was presented. The resulting minimum factor of safety for the upstream slope under full drawdown conditions and the "as built" configuration was 1.35. The resulting minimum factor of safety for the downstream slope under steady state seepage was 1.52. Design revisions of the drainage system, including a chimney drain, foundation drains, and abutment drainage, would increase the analyzed factor of safety from the reported 1.52.

Based upon the above information, coupled with the visual inspection, it is concluded that further stability assessments of the embankment are not necessary.

- c. Operating Records - Nothing in the available operating information indicates cause for concern relative to the structural stability of the dam.
- d. Post-Construction Changes - No changes adversely affecting the structural stability of the dam have been performed.
- e. Seismic Stability - The dam is located in Seismic Zone I of the "Seismic Zone Map of the Contiguous United States," Figure 1, page D-30, "Recommended

Guidelines for Safety Inspections of Dams." This is a zone of minor seismic activity. Therefore, further consideration of the seismic stability is not warranted.

SECTION 7 - ASSESSMENT, RECOMMENDATIONS/REMEDIAL MEASURES

7.1 DAM ASSESSEMENT

- a. Safety - The dam and its appurtenant structures were found to be in good overall condition at the time of the inspection. PA 485 is an "Intermediate" size - "High" hazard dam requiring evaluation for an SDF equal to the PMF. As discussed in Section 5, the dam was designed by the SCS to safely pass the PMF without overtopping the dam. The spillway is therefore considered to be "adequate".
- b. Adequacy of Information - The information available and the observations made during the field inspection are considered to be adequate for a Phase I Inspection of this dam.
- c. Urgency - At the present time, there are no major problems which require remedial action by the owners of the dam.
- d. Necessity for Additional Data/Evaluation - No conditions were observed during the inspection of this dam which warrant additional evaluation at this time.

7.2 RECOMMENDATIONS/REMEDIAL MEASURES

The inspection and review of information revealed several minor deficiencies which require remedial measures by the owners of the dam.

- 1) Remove the debris which has collected in the trash rack in front of the low-level intake on the riser unit.
- 2) Repair the minor tire rutting along the crest of the dam. Vehicles should be prevented from traveling along the dam crest.
- 3) Reseed the areas along the dam crest and berm on the upstream face of the embankment where vegetation is sparse.
- 4) Repair the erosion gully on the downstream side of the dam along the junction of the embankment and right abutment.

- 5) Regrade the berms on the downstream face of the embankment to provide better surface drainage.

It is also recommended that the slide in the left abutment immediately upstream from the emergency spillway be monitored during future inspections to ensure that this does not become a significant problem.

In addition, the following operational measures are recommended to be undertaken by the owner:

- 1) Develop a detailed emergency operation and warning system.
- 2) During periods of unusually heavy rainfall, provide around-the-clock surveillance of the dam.
- 3) When warning of a storm of major proportions is given by the National Weather Service, the owner should activate the emergency operation and warning system.

APPENDIX A

VISUAL INSPECTION CHECK LIST, FIELD SKETCH,
TOP OF DAM PROFILE, AND TYPICAL CROSS-SECTION

Phase 1
Visual Inspection
Check List

Name of Dam PA 485 County Washington State PA Coordinates Lat. N 40°22.2'
 NDI # PA 01123
 PennDER # 63-81
 SCS # PA 485 Long. W 80°30.0'
 Date of Inspection 20 March 1980 Weather Cloudy, cool Temperature 50° F.

Pool Elevation at Time of Inspection 882.3 ft.* M.S.L. Tailwater at Time of Inspection 854.4 ft.* M.S.L.

*All elevations are referenced to a bench mark on the northwest corner of the impact basin,
 El. 860.4 ft. M.S.L. (bench mark was established by the SCS).

Inspection Personnel:

Michael Baker, Jr., Inc.:

Jeffrey A. Quay
 Larry A. Diday
 George A. Slagle

Field Review (9 June 1980):

John A. Dziubek
 James G. Ullinski

Owner's Representatives:

PennDER:

William Francis

Jeffrey A. Quay Recorder

CONCRETE/MASONRY DAMS - Not Applicable

Name of Dam: PA 485

NDI # PA 01123

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
LEAKAGE		
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS		
DRAINS		
WATER PASSAGES		
FOUNDATION		

CONCRETE/MASONRY DAMS - Not Applicable

Name of Dam: PA 485

NDI # PA 01123

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
-----------------------	--------------	----------------------------

SURFACE CRACKS
CONCRETE SURFACES

STRUCTURAL CRACKING

VERTICAL AND HORIZONTAL
ALIGNMENT

MONOLITH JOINTS

CONSTRUCTION JOINTS

EMBANKMENT

Name of Dam PA 485
 NDI # PA 01123

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed	

UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE

None observed

SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES

There is a small slide above the left abutment immediately upstream from the emergency spillway. Earth has slid into the reservoir.
 (Note: A small mud slide was observed during the field review on the downstream left abutment immediately above the rock gutter 30 ft. from the crest. This soil may clog the rock gutter.) There is a small erosion gully on the downstream side of the dam along the junction of the embankment and right abutment.

The slide does not block the emergency spillway or affect the embankment. It does not represent a significant problem at the present time. The erosion gully should be repaired.

EMBANKMENT

Name of Dam PA 485
NDI # PA 01123

VISUAL EXAMINATION OF		OBSERVATIONS	REMARKS OR RECOMMENDATIONS
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST		The vertical and horizontal alignment appeared to be good. There are vehicle tracks and some minor tire rutting on the crest.	Vehicles should be prevented from driving on the crest of the dam.

RIPRAP FAILURES

No riprap has been used on the embankment itself. Riprap placed along the abutment/embankment contacts and below the impact basin is in good condition.

VEGETATION

The embankment is covered with crown vetch. Vegetation is sparse on the crest and in small scattered locations on the downstream embankment. Vegetation is also sparse on the berm on the upstream side of the embankment.

Areas in which the vegetation is sparse should be reseeded.

EMBANKMENT

Name of Dam PA 485
 NDI # PA 01123

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	No problems observed	<p>Regrade the berms on the downstream face to provide better surface drainage.</p>
ANY NOTICEABLE SEEPAGE	<p>None was observed. The downstream embankment is wet where vegetation is sparse, but these areas are above the normal pool elevation. The berms on the downstream face have a small amount of standing water which probably collected as a result of recent precipitation.</p>	
STAFF GAGE AND RECORDER	None	
DRAINS	None observed	

OUTLET WORKS - Principal Spillway

Name of Dam: PA 485

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	The conduit could not be observed.	
INTAKE STRUCTURE	The intake structure is a standard SCS two-stage riser. Concrete is in good condition. Some trash has accumulated around the trash rack at the low-level orifice.	The trash rack should be cleaned.
OUTLET STRUCTURE	The outlet structure is a concrete impact basin. Concrete is in good condition.	
OUTLET CHANNEL	The outlet channel is ripped for the first 15 ft. Water in the outlet channel is high as a result of backwater from obstructions in the downstream channel. These obstructions are described on Page A-12.	The backwater in the outlet channel does not significantly restrict flow from the principal spillway.
EMERGENCY GATE	The inlet to the reservoir drain is located at the base of the riser unit on the upstream side. The inlet is controlled by a 30 in. slide gate operated by controls on the top of the riser unit.	

UNGATED SPILLWAY - Emergency Spillway

Name of Dam: PA 485

NDI # PA 01123

VISUAL EXAMINATION OF		OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONTROL SECTION	The control section for the emergency spillway is a 30 ft. wide (parallel to the direction of flow) by 50 ft. long (perpendicular to the direction of flow) level section. No problems in this section were observed.		
APPROACH CHANNEL	The emergency spillway channel consists of a vegetated earth and rock cut in the hillside next to left abutment. The channel was in good condition. Some water has collected in the emergency spillway.		
DISCHARGE CHANNEL	The discharge channel has the same configuration as the approach channel; no problems were observed.		
BRIDGE AND PIERS	None		

GATED SPILLWAY - Not Applicable

Name of Dam: PA 485
 NDI # PA 01123

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
-----------------------	--------------	----------------------------

CONCRETE SILL

APPROACH CHANNEL

DISCHARGE CHANNEL

BRIDGE AND PIERS

GATES AND OPERATION
 EQUIPMENT

INSTRUMENTATION

Name of Dam: PA 485
 NDI # PA 01123

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	Seventeen (17) crest monuments were installed along the centerline of the dam crest to monitor the settlement and alignment of the dam.	
OBSERVATION WELLS	None	
WEIRS	None	
PIEZOMETERS	Twelve (12) piezometers were installed at various locations on the dam; 3 along the centerline of the dam crest, 5 in the downstream embankment and foundation, and 4 along the downstream toe of the embankment in the insitu soil.	
OTHER		

RESERVOIR

Name of Dam: PA 485
NDI # PA 01123

VISUAL EXAMINATION OF		REMARKS OR RECOMMENDATIONS
OBSERVATIONS		
SLOPES	Slopes are steep and wooded. The only area where erosion is occurring is on the left (east) slope at the downstream end of the reservoir (immediately upstream from the entrance to the emergency spillway). A small slide has occurred and erosion gullies are forming in this area.	The slide is not a significant problem at this time. This area should be monitored during future inspections to ensure that it does not develop into a major problem.

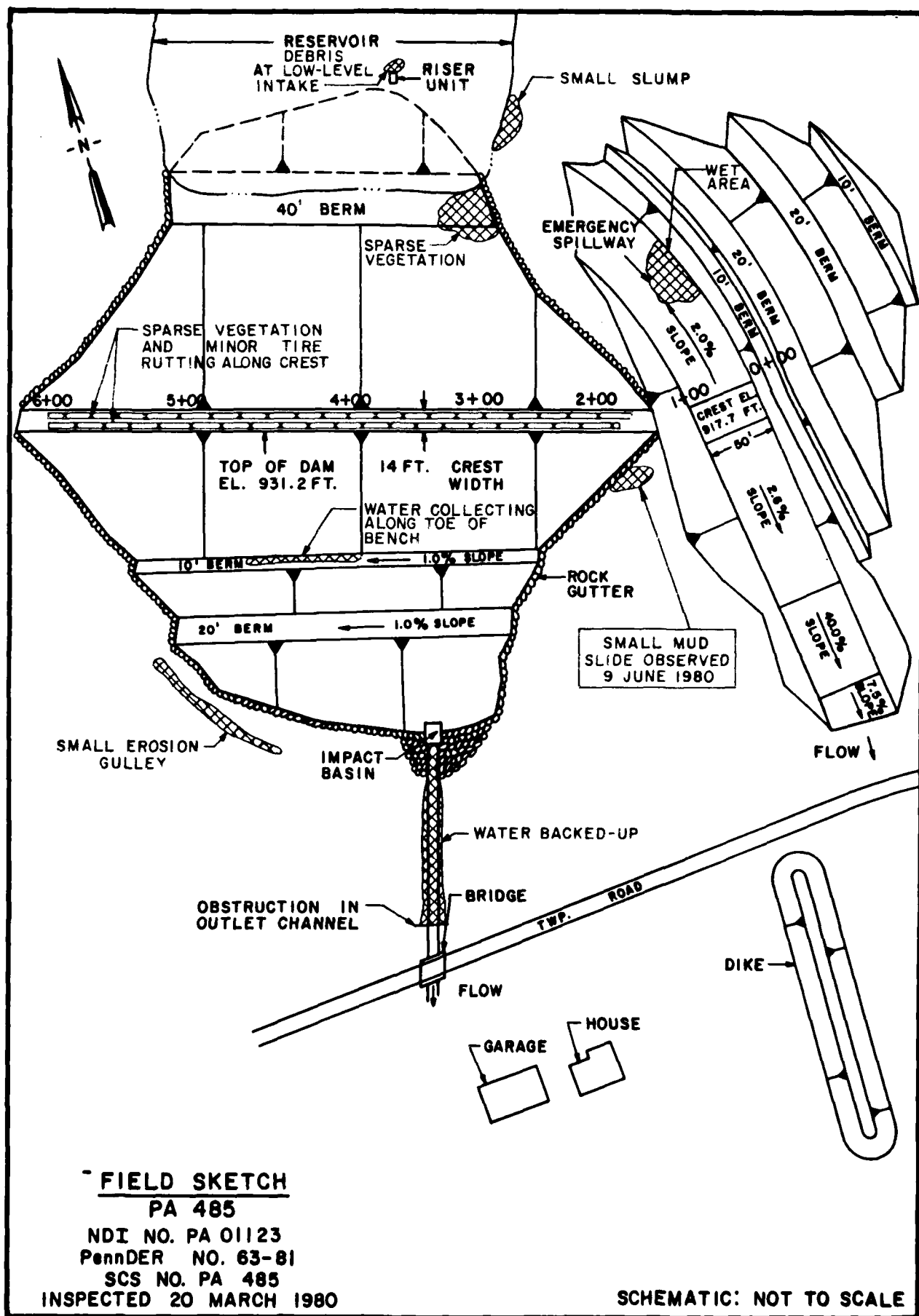
SEDIMENTATION

The dam was designed with a sediment storage volume equal to a 50-year accumulation of sediment. There was no evidence that sedimentation was occurring at a faster rate than that anticipated by the SCS. The slide into the reservoir mentioned earlier does not represent a significant reduction in available sediment storage.

DOWNSTREAM CHANNEL

Name of Dam: PA 485
 NDI # PA 01123

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	A 1.0 ft. high board has been placed across the bottom of the outlet channel approximately 150 ft. downstream from the impact basin. A fence also crosses the channel at this point. Debris collecting in the fence and the board combine to back up water in the channel, forming a pool approximately 2 ft. deep. This was apparently done to provide an area for geese. This does not represent a serious obstruction to flow out of the outlet channel.	
SLOPES	Slope of the channel is moderate.	
APPROXIMATE NO. OF HOMES AND POPULATION	Two houses are located between the dam and Harmon Creek, the closest of which is approximately 200 ft. downstream from the dam. Township route T-819 is also located approximately 175 ft. downstream from the dam.	



MICHAEL BAKER, JR., INC.

PA 485

A-14

THE BAKER ENGINEERS

14 May 1980

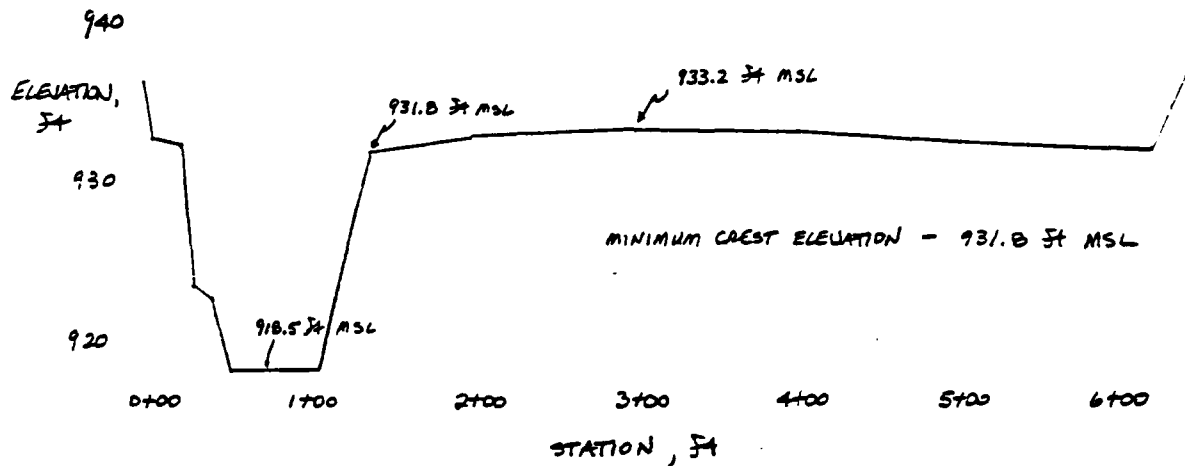
Box 280

Beaver, Pa. 15009

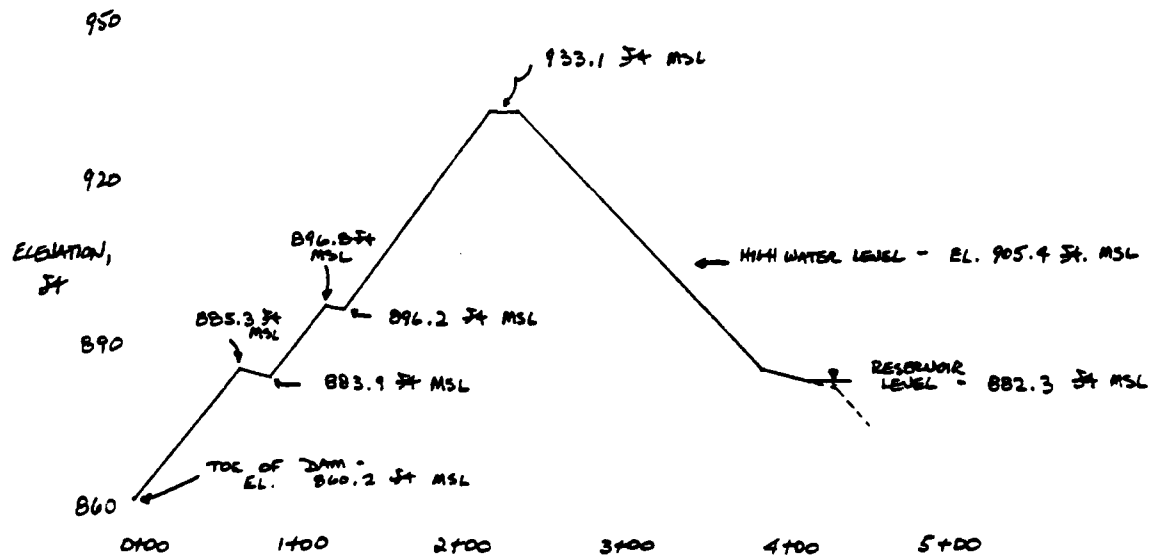
TOP OF DAM PROFILE
TYPICAL CROSS-SECTION

DATE OF INSPECTION - 20 March 1980

TOP OF DAM PROFILE



CROSS-SECTION AT STA 3+12



APPENDIX B

ENGINEERING DATA CHECK LIST

ENGINEERING DATA
CHECK LIST
DESIGN, CONSTRUCTION, OPERATION

Name of Dam: PA 485
NDI # PA 01123

ITEM	REMARKS
PLAN OF DAM	See Plate 3.
REGIONAL VICINITY MAP	The Avella, Burgettstown, and Steubenville East, PA and Weirton, WV - PA - OH 7.5 minute USGS topographic quadrangles were used to prepare the regional vicinity and watershed maps included as Plates 1 and 2 in this report.
CONSTRUCTION HISTORY	Construction of the dam began in April 1976 and was completed in October 1977. The contractor responsible for construction was Solomon - Teslovich of Masontown, PA.
TYPICAL SECTIONS OF DAM	See Plates 5 and 10 and Appendix A, Sheet 14.
HYDROLOGIC/HYDRAULIC DATA	Design computations from the SCS design report for PA 485 were reviewed for this report. These calculations are summarized in Sections 5 and Appendix D.
OUTLETS - PLAN	See Plate 11.
- DETAILS and CONSTRAINTS	See Plates 12, 13, and 14.
- DISCHARGE RATINGS	Discharge ratings were included in the SCS design report for this dam and are summarized in Appendix D.
RAINFALL/RESERVOIR RECORDS	None available

Name of Dam: PA 485

NDI # PA 01123

B-2

ITEM	REMARKS
------	---------

DESIGN REPORTS

The SCS design report for PA 485 is available from the Harrisburg, PA SCS office.

GEOLOGY REPORTS

See Appendix F for the regional geology; additional information is available in the SCS design report for PA 485.

DESIGN COMPUTATIONS
HYDROLOGY & HYDRAULICS
DAM STABILITY
SEEPAGE STUDIES

These analyses are all contained in the SCS design report for PA 485.

MATERIALS INVESTIGATIONS
BORING RECORDS
LABORATORY
FIELD

The results of foundation and borrow excavation tests are contained in the SCS design report for this dam.

POST-CONSTRUCTION SURVEYS OF DAM

None

BORROW SOURCES

The majority of the borrow material used for construction of the embankment was taken from the area above the left abutment. Some material was also taken from the valley floor upstream from the dam and from the emergency spillway excavation. Further specifications concerning the borrow material used are contained in the SCS design report.

Name of Dam: PA 485

D-3

ITEM	REMARKS
MONITORING SYSTEMS	17 crest monuments and 12 piezometers were installed at the dam site. Their locations are shown in Plates 15 and 7, respectively.
MODIFICATIONS	None
HIGH POOL RECORDS	The highest pool level of record is at El. 905.4 ft. M.S.L. This high water resulted when local residents reportedly blocked the inlets on the riser unit. This was not discovered and corrected by Washington County personnel until water had reached the elevation stated above. No problems were reported as a result of this high water level.
POST-CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None
MAINTENANCE OPERATION RECORDS	No records are available. Routine maintenance is performed by Washington County personnel.

Name of Dam: PA 485
NDI # PA 01123

ITEM	REMARKS
------	---------

SPILLWAY PLAN,

SECTIONS,
and
DETAILS

See Plates 3 and 4.

OPERATING EQUIPMENT
PLANS & DETAILS

The only operating equipment is the 30 in. gate valve controlling the reservoir drain. The location of this drain is shown on Plates 11 and 13.

CHECK LIST
HYDROLOGIC AND HYDRAULIC DATA
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 2.18 sq.mi. (Primarily forested with some residential areas in the upper portion of the basin)

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 879.5 ft. M.S.L.
(43.5 ac.-ft.)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 917.7 ft. M.S.L.
(536.8 ac.-ft.)

ELEVATION MAXIMUM DESIGN POOL: 920.9 ft. M.S.L. (621.8 ac.-ft.)

ELEVATION TOP DAM: 931.8 ft. M.S.L. (minimum top of dam)

SPILLWAY: Emergency Spillway

- a. Crest Elevation 917.7 ft. M.S.L.
- b. Type Vegetated trapezoidal earth and rock cur channel
- c. Bottom Width (Perpendicular to Flow) 50 ft.
- d. Length of Spillway along Centerline (Parallel to Flow) 440 ft.
- e. Location Spillover Left abutment
- f. Number and Type of Gates None

OUTLET WORKS: Principal Spillway

- a. Type 2-stage drop-inlet riser connected to a 30 in. concrete
- b. Location 250 ft. from the left abutment outlet pipe
- c. Entrance Inverts El. 879.5 ft. M.S.L. (low-level inlet);
- d. Exit Inverts El. 853.0 ft. M.S.L. El. 895.5 ft. M.S.L. (upper-level inlet)
- e. Emergency Drawdown Facilities 30 in. drain, invert El. 855.5 ft. M.S.L. at base of riser unit.

HYDROMETEOROLOGICAL GAGES: None

- a. Type _____
- b. Location _____
- c. Records _____

MAXIMUM KNOWN NON-DAMAGING DISCHARGE 120 c.f.s.

APPENDIX C

PHOTOGRAPH LOCATION PLAN AND PHOTOGRAPHS

DETAILED PHOTOGRAPH DESCRIPTION

Overall View of Dam

Top Photo - (OV-T)	Overall View of Upstream Face of Dam from Reservoir Area
Bottom Photo - (OV-B)	Overall View of Crest of Dam and Downstream Face from Right Abutment

Photograph Location Plan

Photo 1 - View along Crest of Dam from Right Abutment

Photo 2 - View of Riser Unit from Reservoir Area

Photo 3 - View of Debris on Upstream Face of Dam
(Note: debris was deposited by high water level described in Section 5)

Photo 4 - View of Eroded and Sloughing Area of Reservoir Slope to the Left of Emergency Spillway

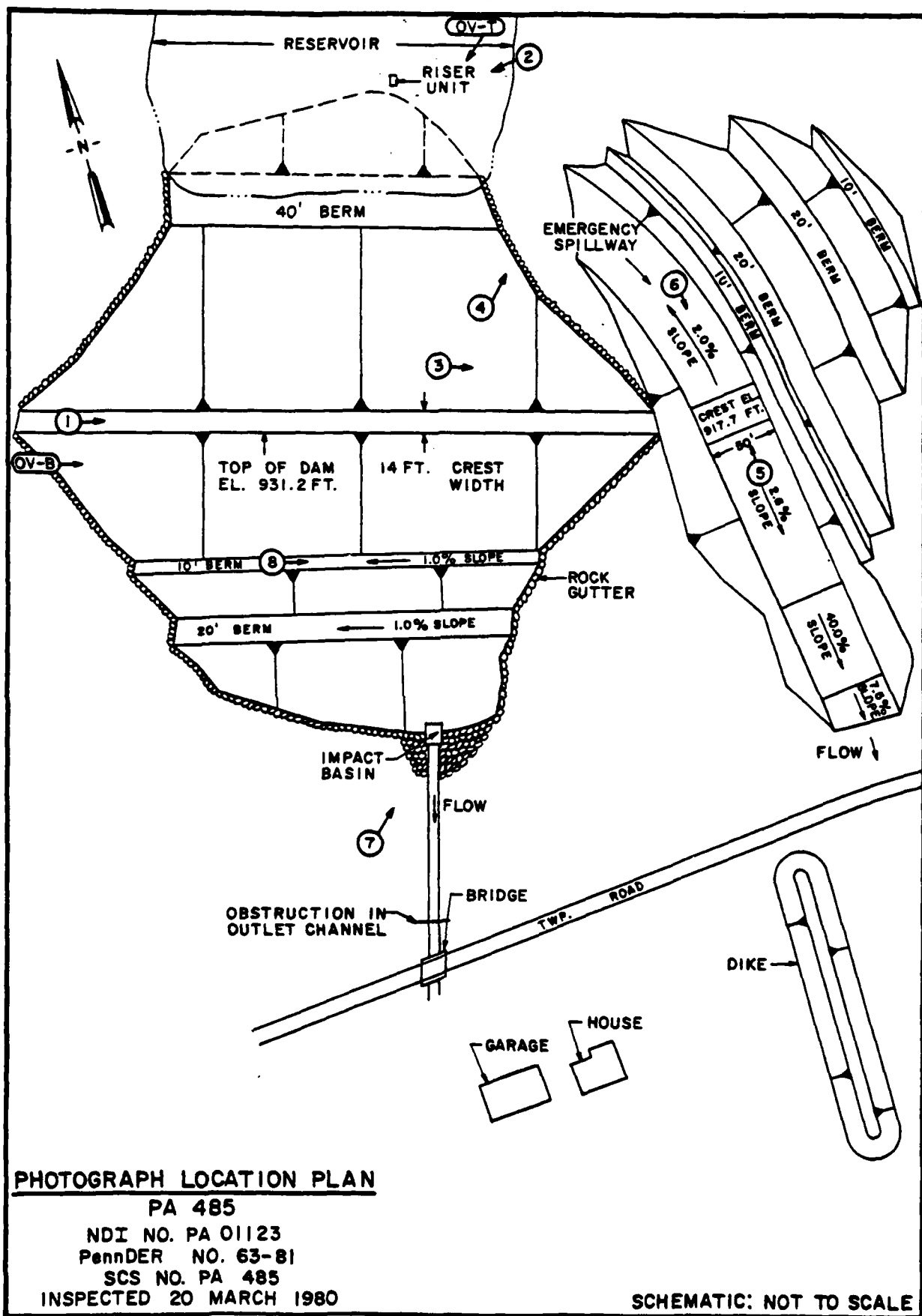
Photo 5 - View of Emergency Spillway Looking Upstream

Photo 6 - View of Emergency Spillway Looking Downstream

Photo 7 - View of Impact Basin and Rock Gutter along Left Abutment

Photo 8 - View of Water Collecting at Toe of Bench on Downstream Side of Embankment

Note: Photographs were taken on 20 March 1980.



PA 485

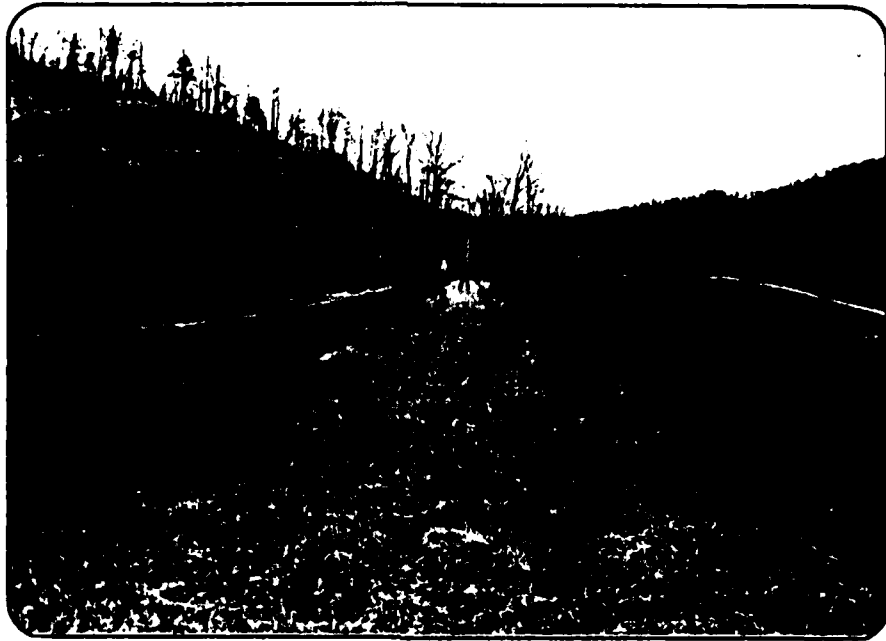


PHOTO 1. View along Crest of Dam from Right Abutment

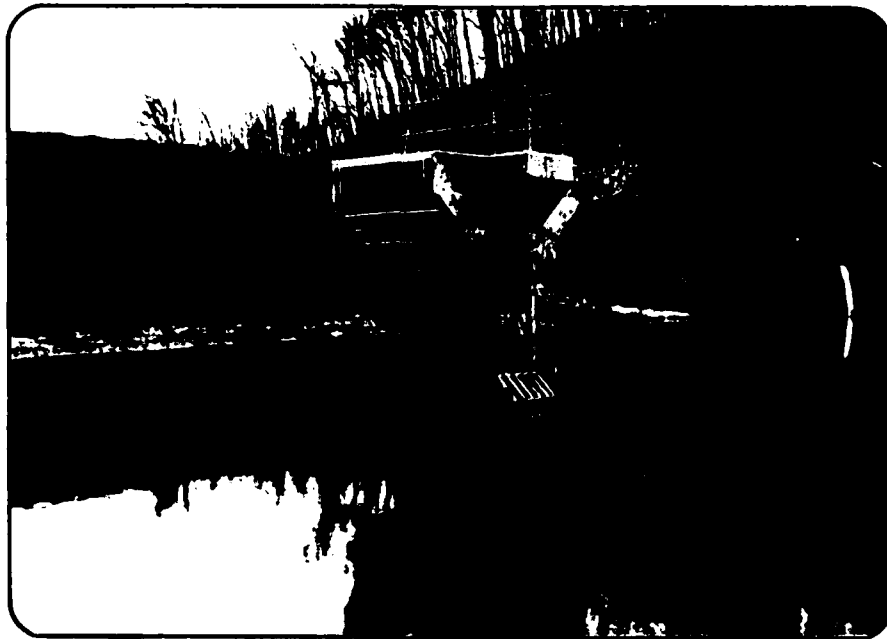


PHOTO 2. View of Riser Unit from Reservoir Area

PA 485



PHOTO 3. View of Debris on Upstream Face of Dam

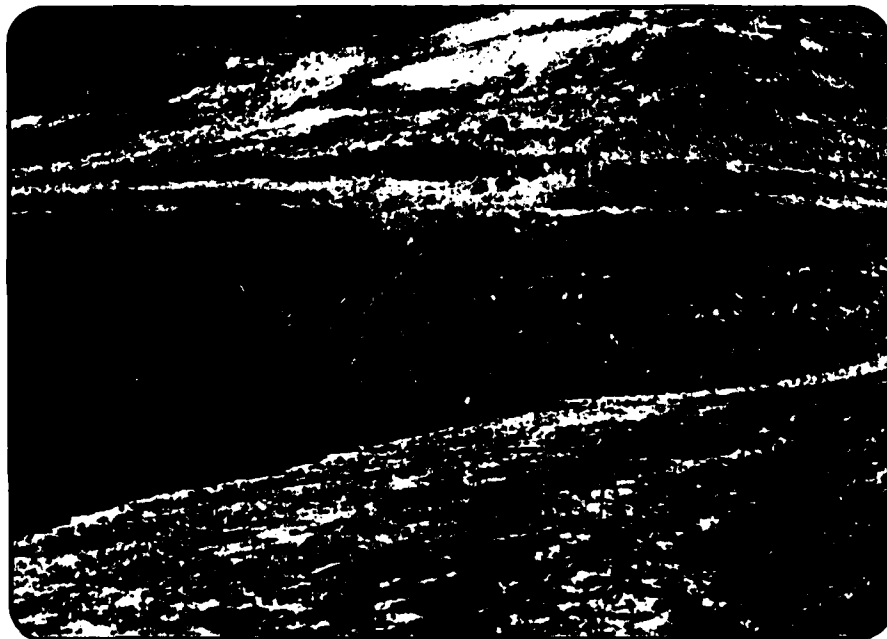


PHOTO 4. View of Eroded and Sloughing Area of Reservoir Slope to the Left of Emergency Spillway

PA 485



PHOTO 5. View of Emergency Spillway Looking Upstream

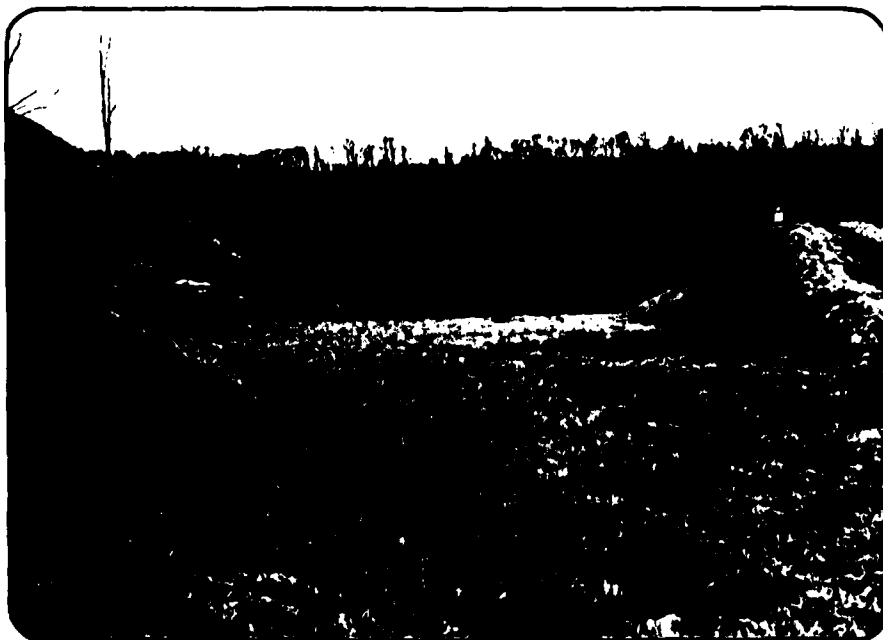


PHOTO 6. View of Emergency Spillway Looking Downstream

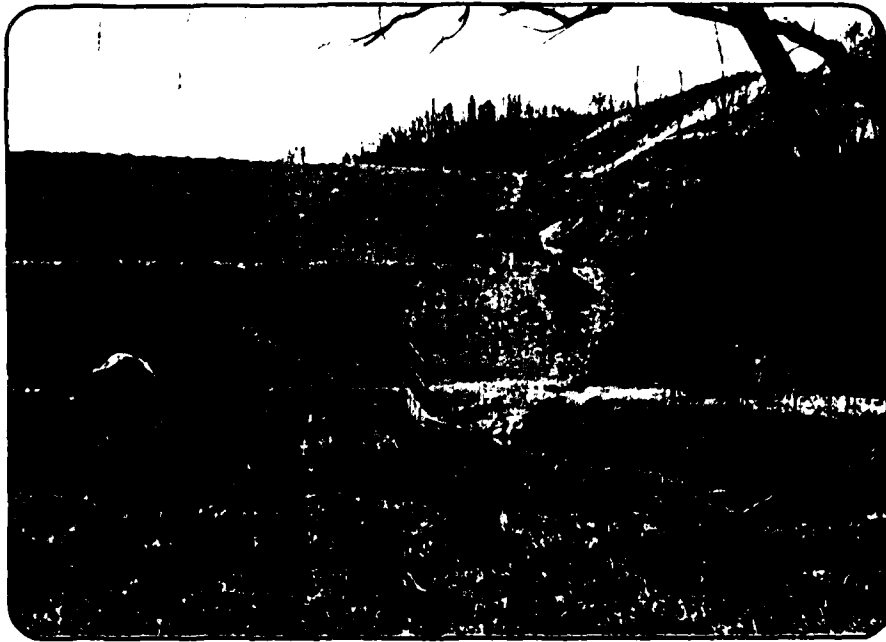


PHOTO 7. View of Impact Basin and Rock Gutter along Left Abutment

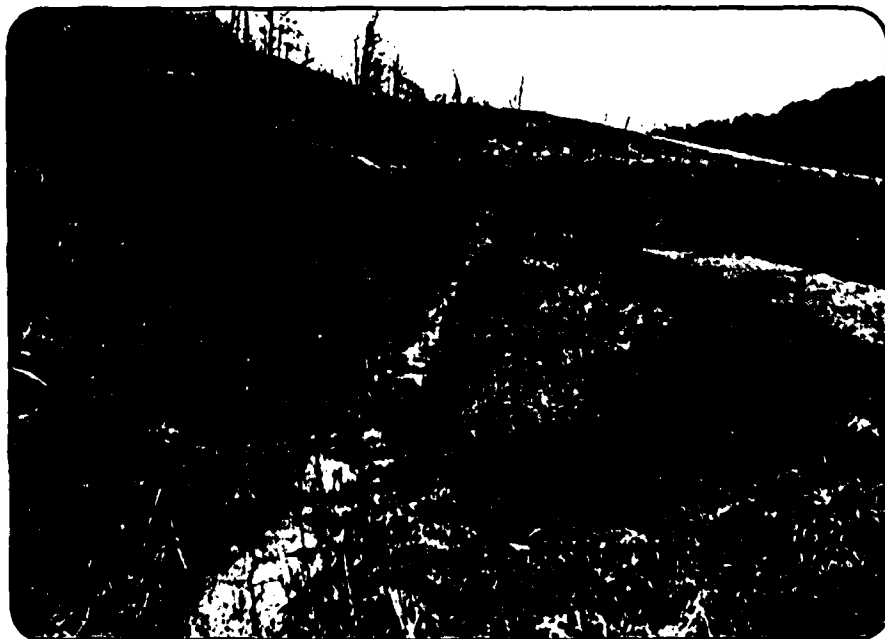


PHOTO 8. View of Water Collecting at Toe of Bench on Downstream Side of Embankment

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

MICHAEL BAKER, JR., INC.

THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject PA 485

S.O. No. _____

APPENDIX D - HYDROLOGIC AND

Sheet No. _____ of _____

HYDRAULIC CALCULATIONS

Drawing No. _____

Computed by _____

Checked by _____

Date _____

<u>SUBJECT</u>	<u>PAGE</u>
HYDROLOGY AND HYDRAULIC DATA BASE	1
REMARKS	2
HYDROLOGIC DATA	3
STAGE vs. AREA, STORAGE, DISCHARGE DATA	4
TOP OF DAM PROFILE AND TYPICAL CROSS-SECTION	5
DRAINAGE BASIN MAP	6

HYDROLOGY AND HYDRAULIC ANALYSIS
DATA BASE

NAME OF DAM: PA 485

PROBABLE MAXIMUM PRECIPITATION (PMP) = 24.1 INCHES/24 HOURS⁽¹⁾

STATION	1	2	3	4	5
Station Description	PA 485				
Drainage Area (square miles)	2.18				
Cumulative Drainage Area (square miles)	2.18				
Adjustment of PMF for Drainage Area (%) ⁽²⁾	Zone 7				
6 Hours	102				
12 Hours	120				
24 Hours	130				
48 Hours	140				
72 Hours	-				
Snyder Hydrograph Parameters					
Zone ⁽³⁾	28B				
C_p/C_t ⁽⁴⁾	0.57/1.7				
L (miles) ⁽⁵⁾	2.89				
L_{ca} (miles) ⁽⁵⁾	1.53				
$t_p = C_t (L \cdot L_{ca})^{0.3}$ (hours)	2.66				
Spillway Data					
Crest Length (ft)	(Spillway rating curve information is presented on Sheet 4)				
Freeboard (ft)					
Discharge Coefficient					
Exponent					

⁽¹⁾ Hydrometeorological Report 33 (Figure 1), U.S. Army, Corps of Engineers, 1956.

⁽²⁾ Hydrometeorological Report 33 (Figure 2), U.S. Army, Corps of Engineers, 1956.

⁽³⁾ Hydrological zone defined by Corps of Engineers, Baltimore District, for determining Snyder's Coefficients (C_p and C_t).

⁽⁴⁾ Snyder's Coefficients.

⁽⁵⁾ L = Length of longest water course from outlet to basin divide.

L_{ca} = Length of water course from outlet to point opposite the centroid of drainage area.

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Subject PA 485 S.O. No. _____
Sheet No. 2 of 6
Drawing No. _____
Computed by WDL Checked by _____ Date 5/29/80

PA 485 was designed by the SCS in accordance with standard criteria for structures of this type. The design flood used by the SCS for this dam is based on precipitation essentially equal to the Probable maximum Precipitation. Therefore, the dam should be capable of passing the Probable maximum Flood (PMF) without overtopping.

A summary of the key information used by the SCS in the design of PA 485 is included on the following pages.

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Subject PA 485 S.O. No. _____
HYDROLOGIC DATA Sheet No. 3 of 6
Drawing No. _____
Computed by WDL Checked by _____ Date 5-31-80

THE FOLLOWING INFORMATION WAS TAKEN FROM THE SCS DESIGN REPORT:

DRAINAGE AREA = 2.18 SQ. MI.

TIME OF CONCENTRATION = 1.39 HOURS

CURVE NUMBER (AMC II) = 74

STORM DURATION = 6 HOURS

HYDROGRAPH	RAINFALL (IN)	RUNOFF (IN)	PEAK INFLOW (CFS)	PEAK OUTFLOW (CFS)	MAXIMUM RESERVOIR SURFACE ELEV. (FT)
EMERGENCY SPILLWAY	9.45	6.25	3,304	825	920.9
FREEBOARD	25.5	21.7	11,800	8,693	931.2

6 HOUR PMP (FROM HMR-33) = 24.6 INCHES

MICHAEL BAKER, JR., INC.

THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009Subject PA 485

S.O. No. _____

STAGE VS. AREA, STORAGE DATASheet No. 4 of 6STAGE VS. DISCHARGE DATA

Drawing No. _____

Computed by WDL

Checked by _____

Date 5-31-80

THE FOLLOWING DATA WAS TAKEN FROM THE SCS DESIGN
REPORT FOR PA 485 :

STAGE (FL)	AREA (AC.)	STORAGE (AC-FT)	REMARKS
879.5'	5.7	43.5	INVERT OF ORIFICE
885.0	7.7	83	
890.0	9.9	127	
895.5	12.4	189.8	CREST OF RISER (UPPER LEVEL INTAKE)
910.0	19.9	418	
917.7	25.5	536.8	CREST OF EMERGENCY SPILLWAY
920.9	27.7	621.8	DESIGN HIGH WATER
925.0	31.4	800	
931.2	37	951.8	TOP OF DAM

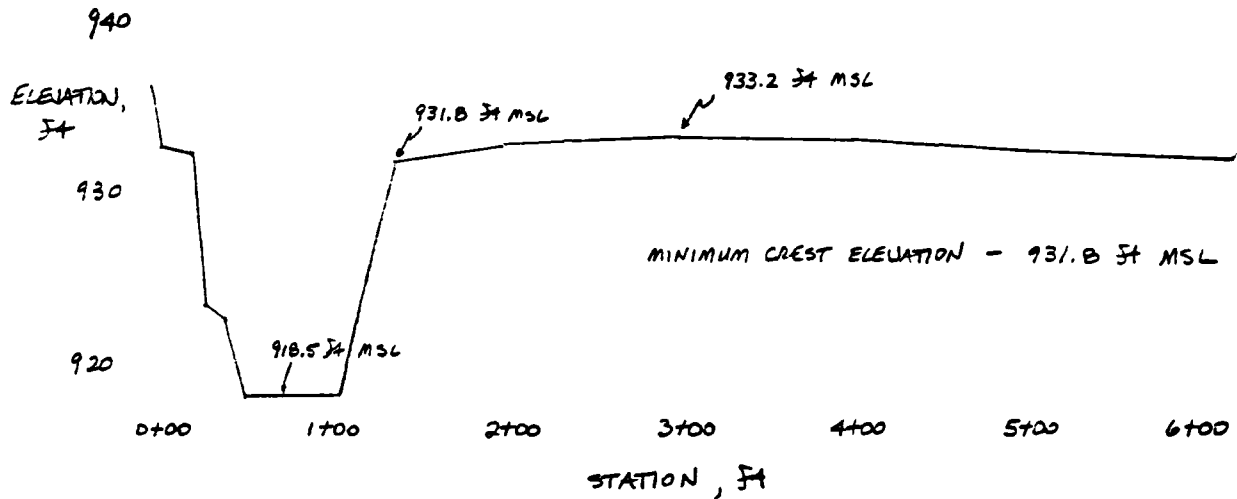
STAGE (FT)	DISCHARGE (CFS)	REMARKS
879.5	0	INVERT OF ORIFICE
880.0	1.65	
882.0	10.2	
885.0	16.2	
891.0	24.0	
893.0	26.1	
895.5	28.5	CREST OF RISER (UPPER LEVEL INTAKE)
897.0	115	
917.7	132	CREST OF EMERGENCY SPILLWAY
920.9	825	DESIGN HIGH WATER
931.2	8693	TOP OF DAM

MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

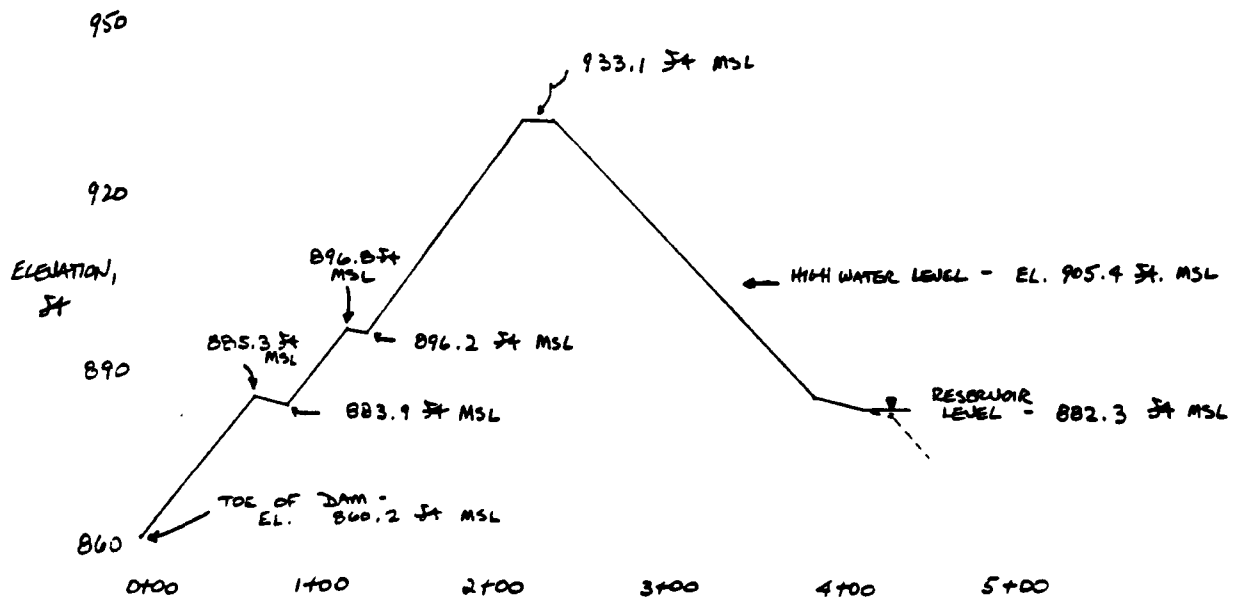
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Beaver, Pa. 15009

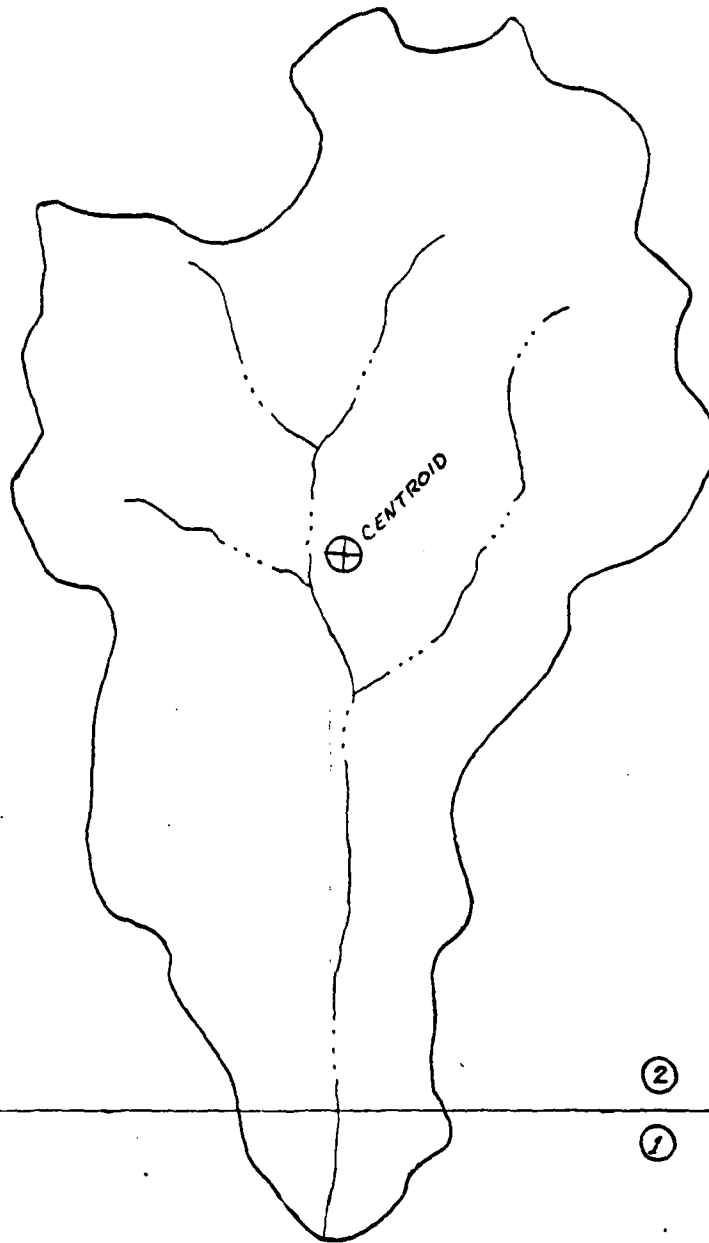
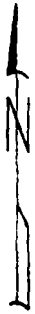
Subject TOP OF DAM PROFILE AND S.O. No. _____
TYPICAL CROSS-SECTION Sheet No. 5 of 6
Drawing No. _____
Computed by LAD Checked by WDL Date 5-14-80

TOP OF DAM PROFILE



CROSS-SECTION AT STA 3+12





QUADS:

1. AVELLA
2. BURGETTSTOWN
3. STEUBENVILLE EAST
4. WEIRTON W. VA. - PA. - OHIO

PA-485

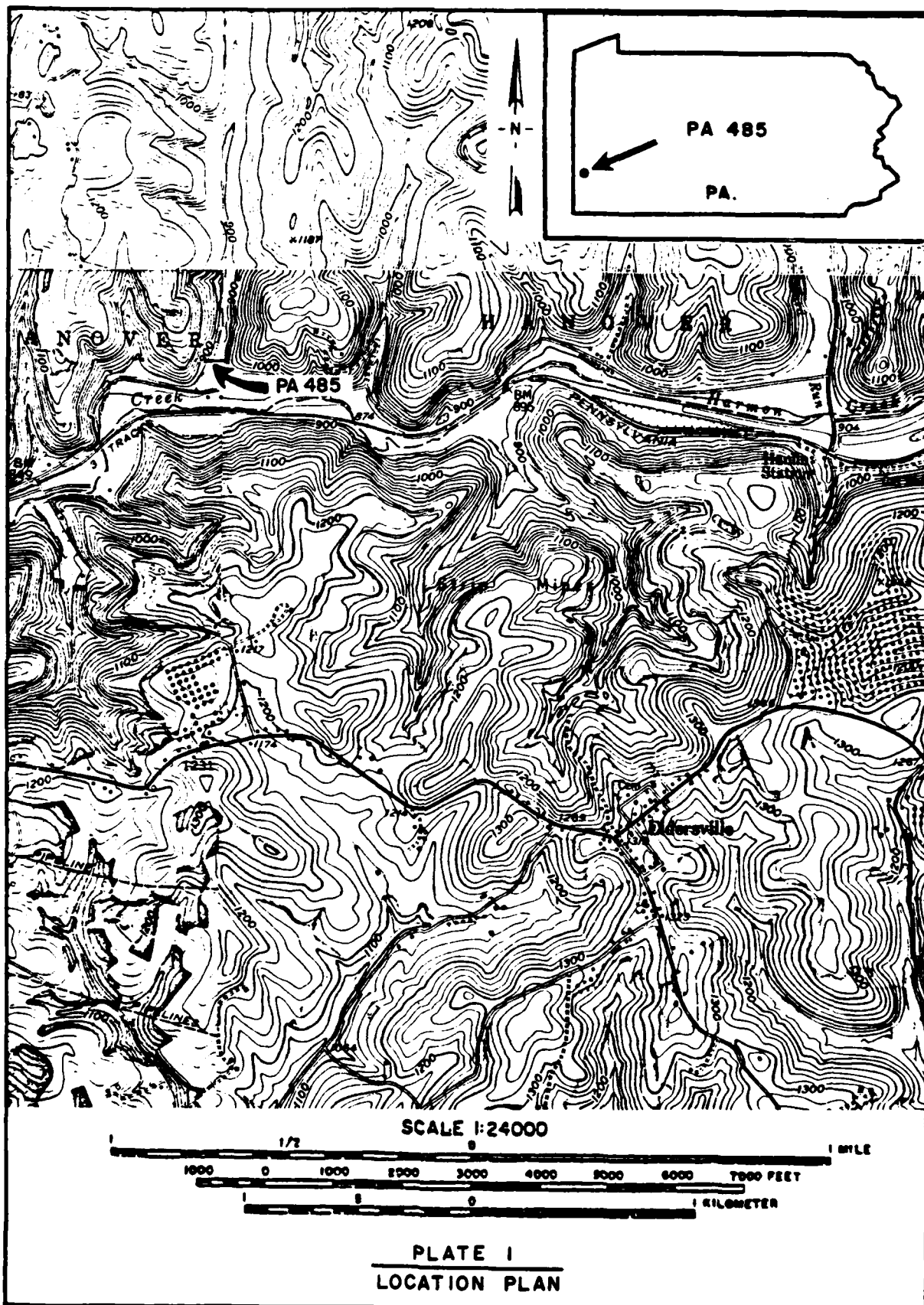
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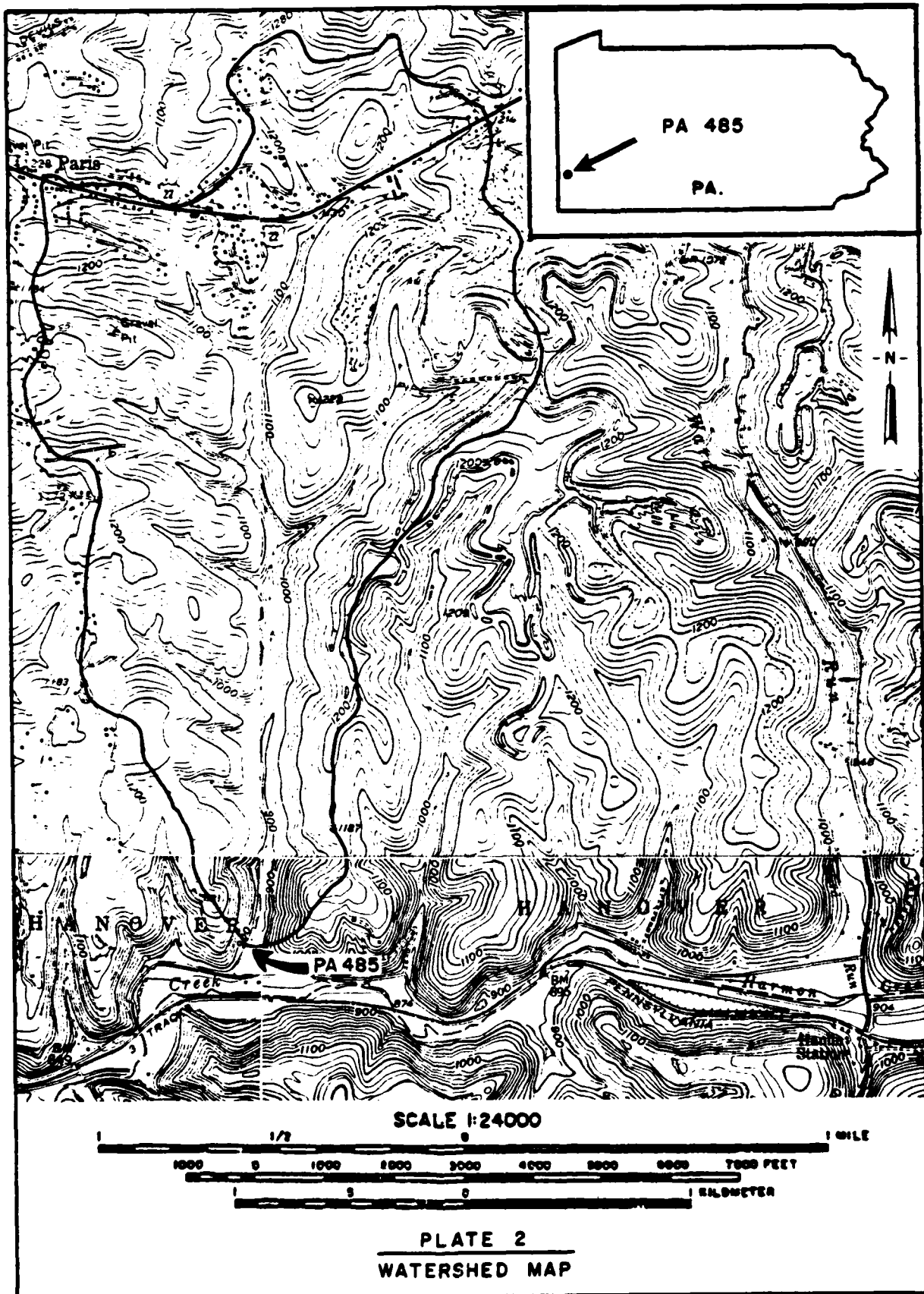
APPENDIX E

PLATES

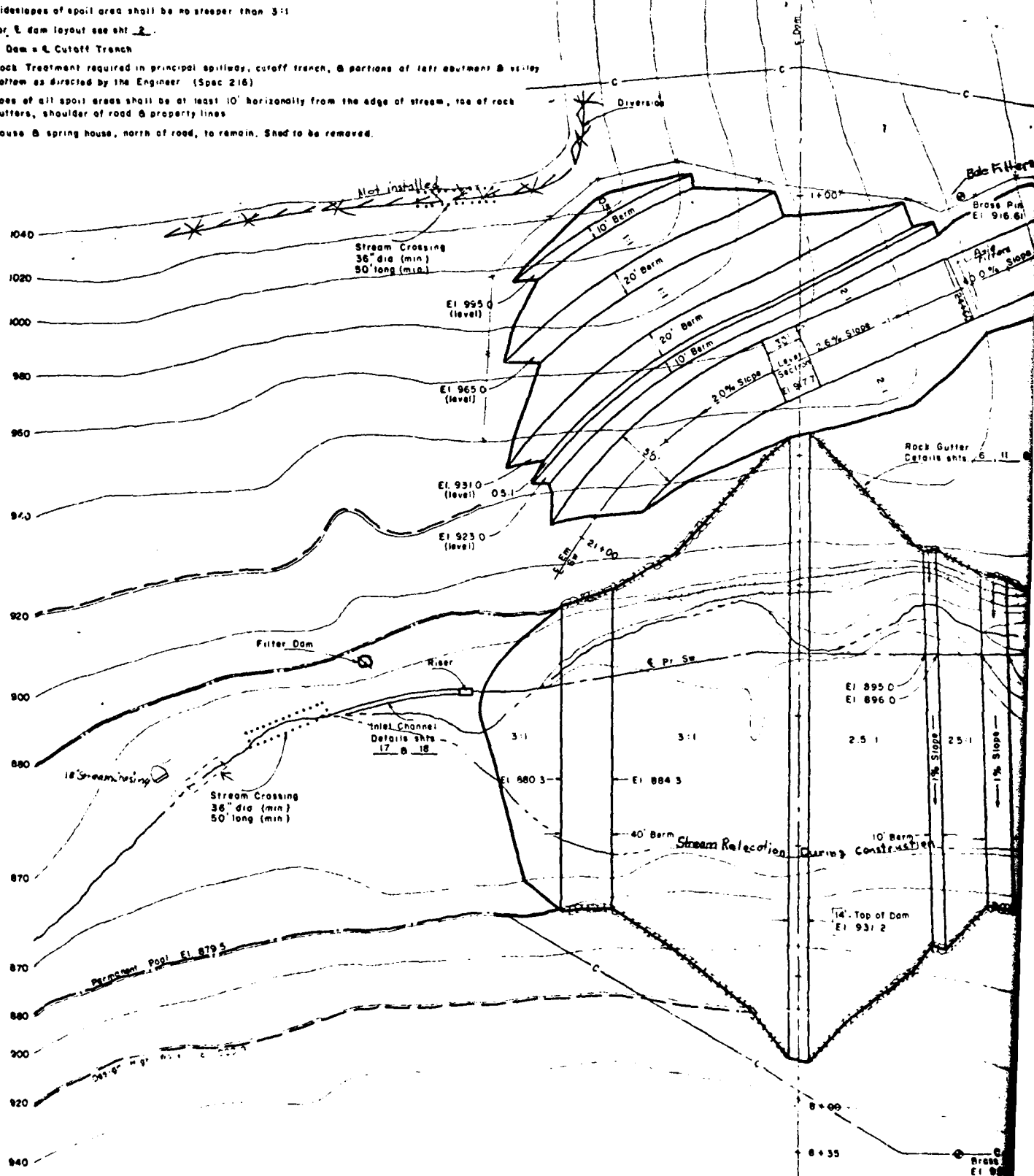
CONTENTS

- Plate 1 - Location Plan
- Plate 2 - Watershed Map
- Plate 3 - Plan of Structural Works
- Plate 4 - Emergency Spillway
- Plate 5 - Fill Placement
- Plate 6 - Cut-off Trench
- Plate 7 - Piezometer Installation
- Plate 8 - Foundation Drainage
- Plate 9 - Chimney Drain
- Plate 10 - Chimney Drain (Sections)
- Plate 11 - Principal Spillway
- Plate 12 - Principal Spillway (Profile)
- Plate 13 - Riser
- Plate 14 - Impact Basin
- Plate 15 - Crest Monument Installation





- CONSTRUCTION NOTES**
1. All structure areas to be cleared & grubbed, or borrow areas to be cleared & grubbed as needed; as directed by the Engineer.
 2. Spoil area to be Class B clearing. Spoil areas shall be left with at least two feet of cover over any brush, stumps or boulders, & shall be shaped to provide drainage as directed by the Engineer.
 3. Sideslopes of spoil area shall be no steeper than 3:1.
 4. For E. dam layout see sheet 2.
 5. E. Dam & Cutoff Trench
 6. Rock Treatment required in principal spillway, cutoff trench, & portions of left abutment & valley bottom as directed by the Engineer. (Spec 216)
 7. Toes of all spoil areas shall be at least 10' horizontally from the edge of stream, toe of rock gutters, shoulder of road & property lines.
 8. House & spring house, north of road, to remain. Shed to be removed.



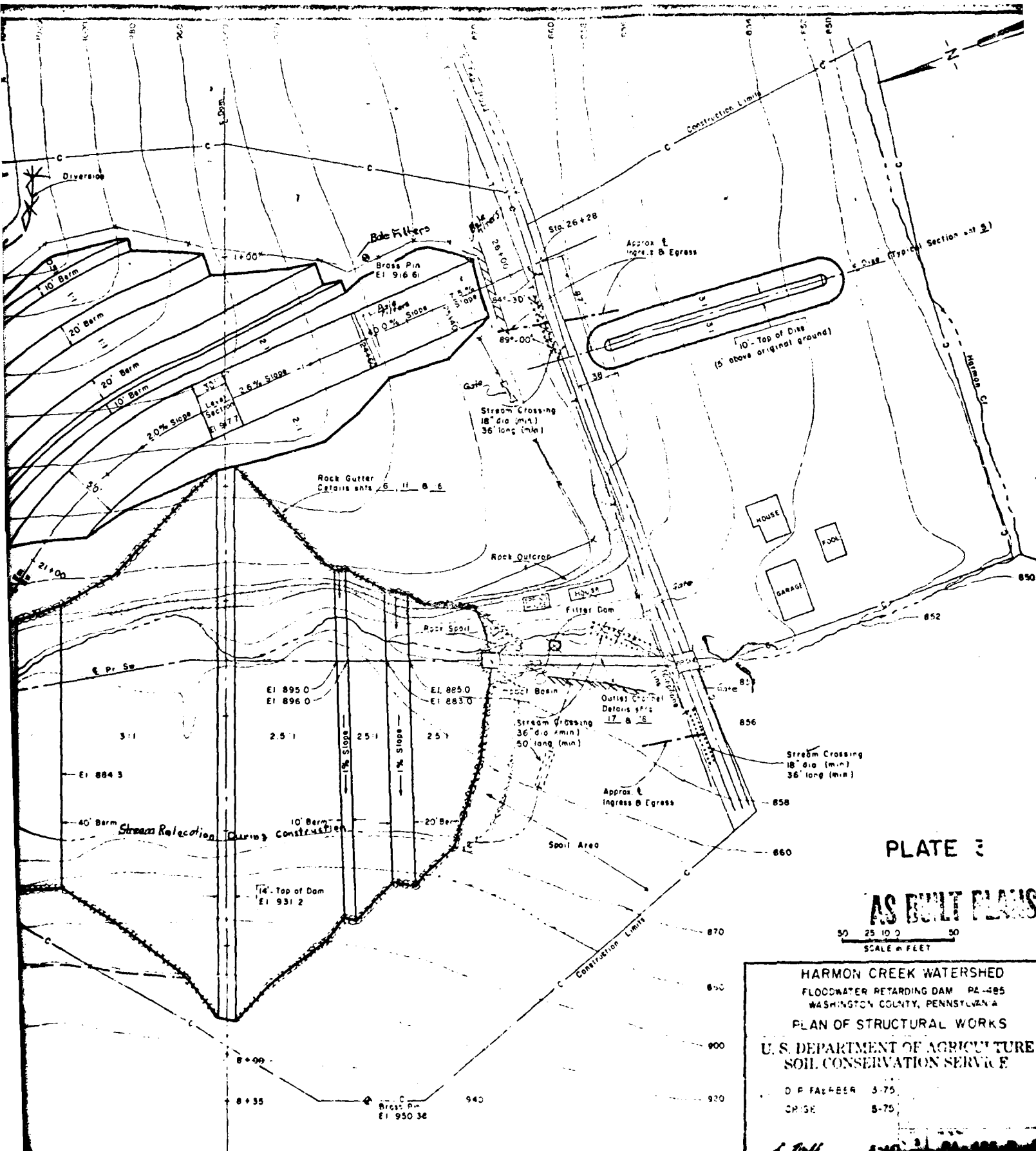


PLATE 3

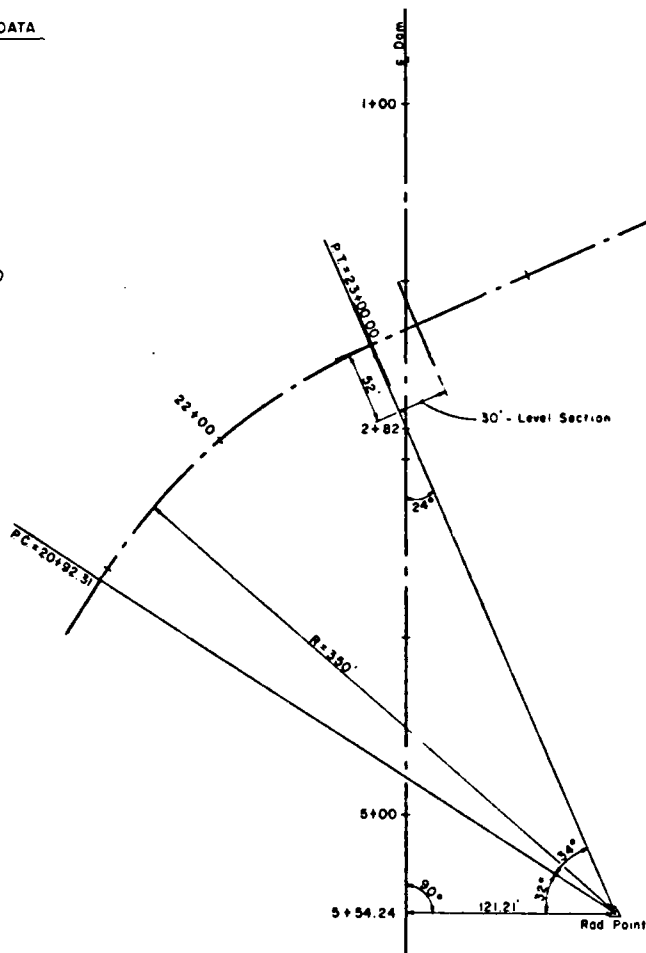
AS BUILT PLANS

SCALE IN FEET
0 25 50 100

HARMON CREEK WATERSHED
FLOODWATER RETARDING DAM PA-485
WASHINGTON COUNTY, PENNSYLVANIA
PLAN OF STRUCTURAL WORKS
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
D. P. FALBERG 3-75
C. P. GEE 8-75
J. P. Full

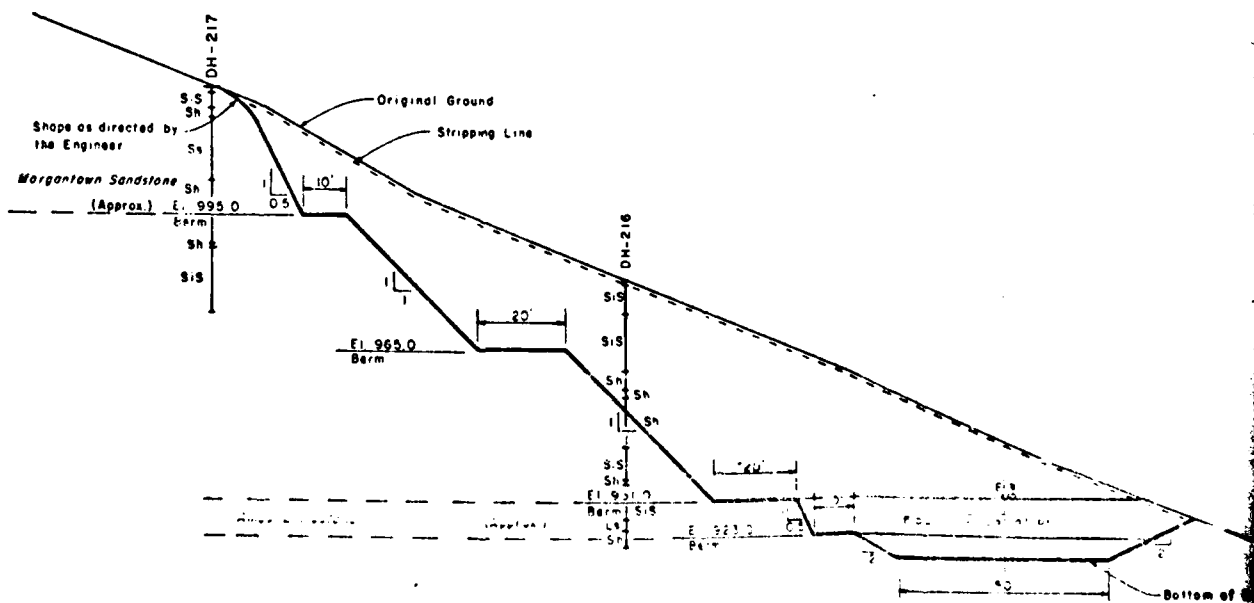
EM. SW. LAYOUT DATA

$I = 34^{\circ}-00'$
 $R = 350'$
 $E = 15.99'$
 $M = 15.29'$
 $C = 204.66'$
 $L = 207.69'$
 $T = 107.01'$
 $PC = 20+92.31$
 $PT = 23+00.00$

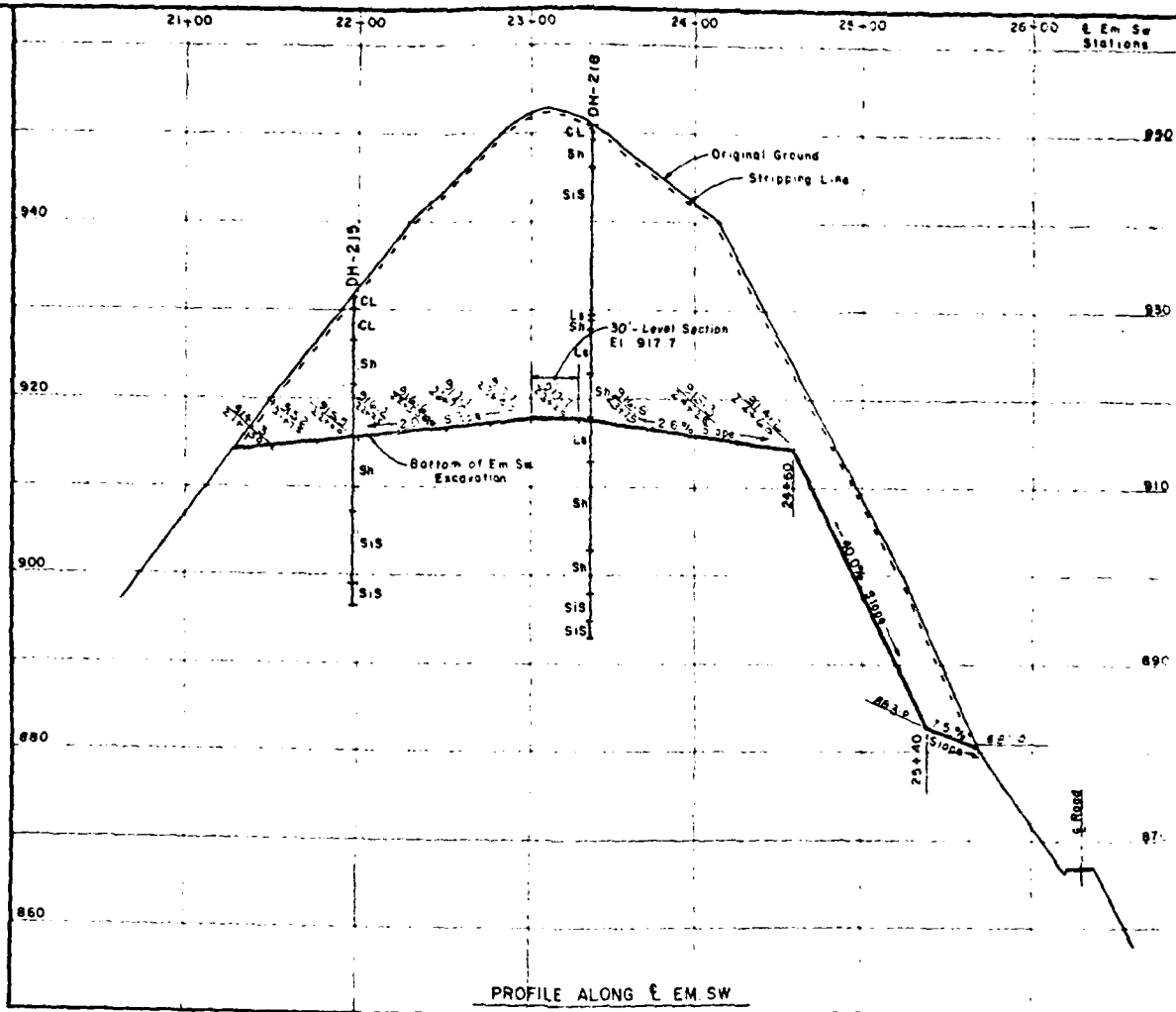


EM. SW. LAYOUT

50 25 10 0 50
 SCALE in FEET



SECTION (STA 22+50)



NOTE:

Engineer may authorize changes to side slopes and berms in outside cut to reflect geologic conditions encountered

PLATE 4 AS BUILT PLANS

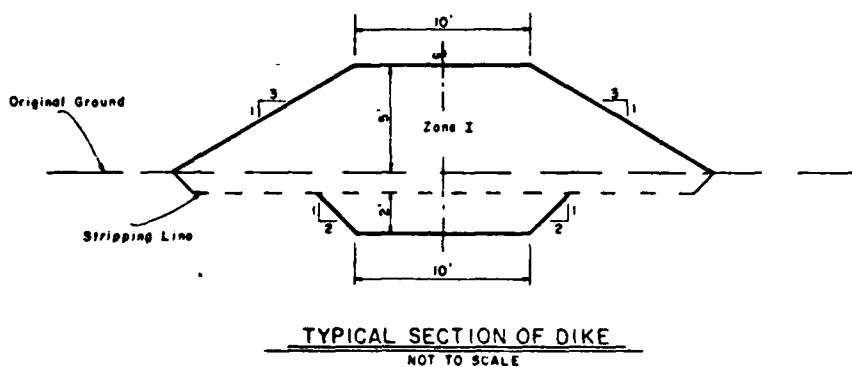
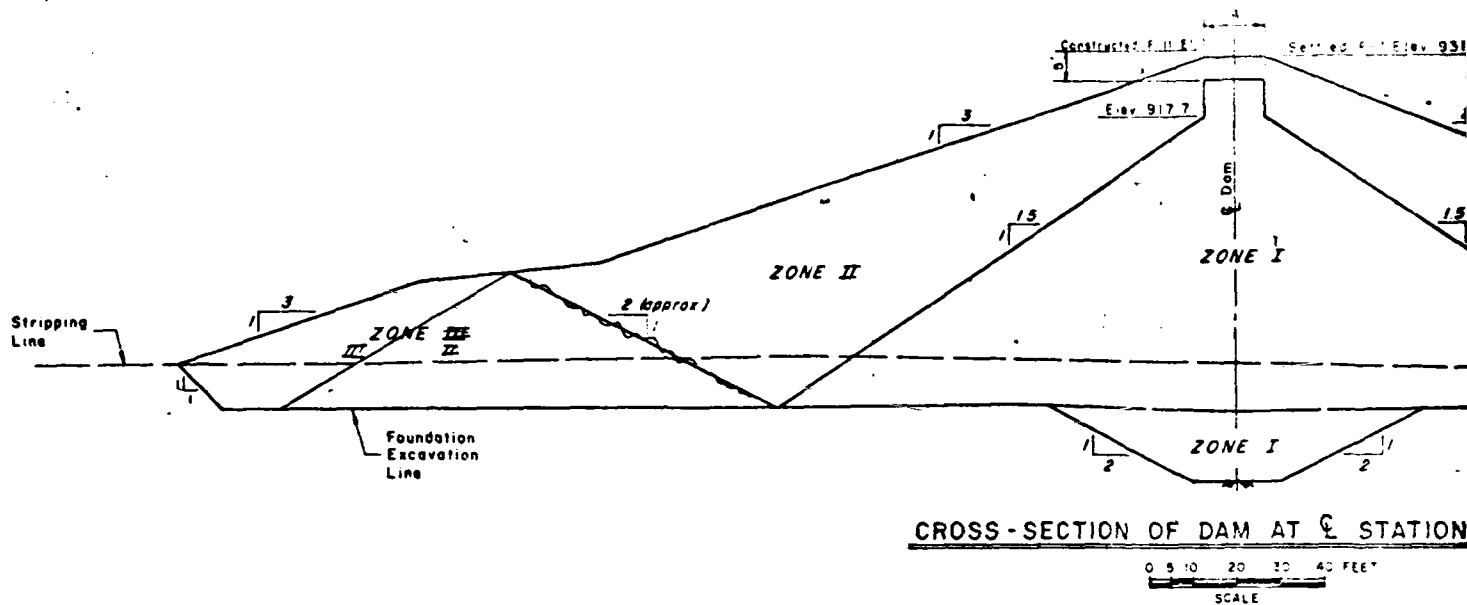
HARMON CREEK WATERSHED
FLOODWATER RETARDING DAM PA-155
WASHINGTON COUNTY, PENNSYLVANIA
EMERGENCY SPILLWAY

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

D. P. FAIRBANKS 3-75

CRICK 3-75

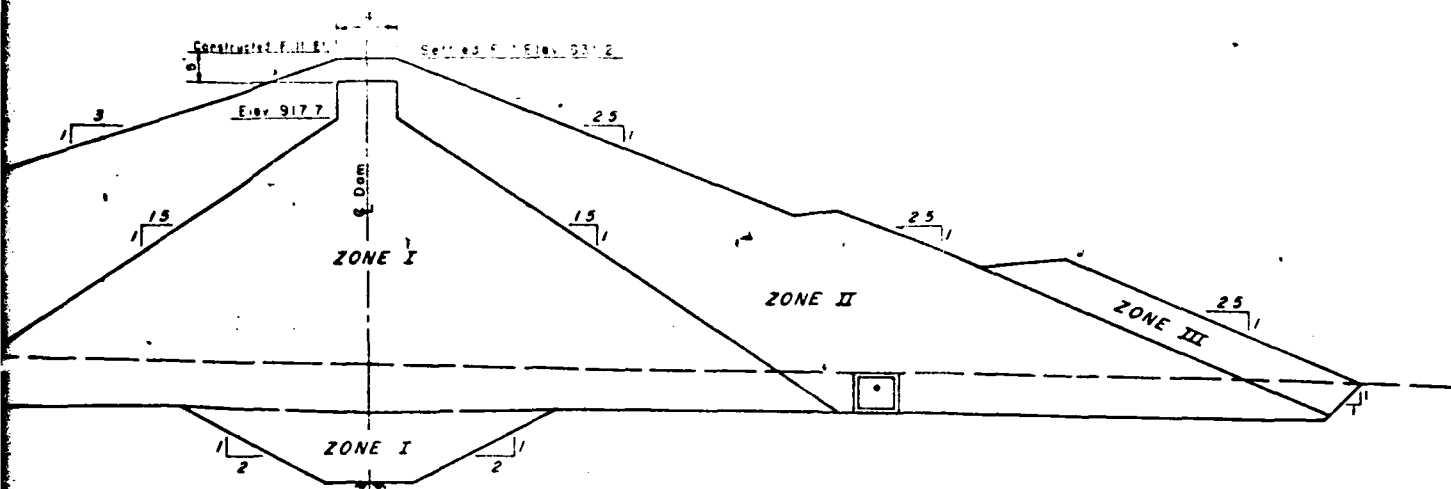
PA-485-P



SELECTIVE PLACEMENT	MATERIAL	MAX. ROCK SIZE	MAX. LIFT	REQ'D. WATER CONTENT	COMPACTION	
					CLASS	DEFINITION
ZONE I	Material as represented by TP-103A, depth 5.5' to 10.0', classified as ML, TP-202A, 10' to 2.3', classified as CL, TP-203A, 10' to 20', classified as CH, TP-203A, 30' to 60', classified as CL, Foundation Excavation Alluvium CL and SC.	6"	9"	-2% to +2% of Optimum	A	100% Standard density by ASTM D-698, Method A
ZONE II	Material as represented by TP-106A, depth 3.2' to 6.0', classified as GM, Residuals (SM-SP) Mine Spoil	12"	18"	-2% to +2% of Optimum Minus 3/4" material - ASTM D-698 Method D	C	Minimum 6 passes with a 45C psi. tamping roller per lift

SELECTIVE PLACEMENT	MATERIAL	MAX. ROCK SIZE	MAX. LIFT	REQ'D. WATER CONTENT
ZONE III	Material from Emergency Spillway, Cutoff Trench, Principal Spillway and left abutment rock excavation and cobbles and boulders raked from Zones I & II	24"	36"	Natural Moisture

- 1] Maximum permissible lift thickness before compaction
- 2] Water content of fill matrix at time of compaction. We may be approved by the Engineer
- 3] For typical compaction curves see sheets 51 and 52
- 4] For hand compacted backfill, the maximum rock size shall not exceed 4"



CROSS-SECTION OF DAM AT STATION 5+30

0 5 10 20 30 40 FEET
SCALE

PLATE 5

CONSTRUCTION NOTES

1. For constructed fill elevations see sheet 7.
2. For berm elevations and slopes see sheet 3.

AS BUILT PLANS

SELECTIVE PLACEMENT	MATERIAL	MAX. ROCK SIZE	MAX. LIFT	REQ'D. WATER CONTENT	COMPACTION	
					CLASS	DEFINITION
ZONE III	Material from Emergency Spillway, Cutoff Trench, Principal Spillway and left abutment rock excavation and cobbles and boulders raked from Zones I & II	24"	36"	Natural Moisture	C	Minimum 4 passes per lift with a crawler dozer weighing 20 ton or more

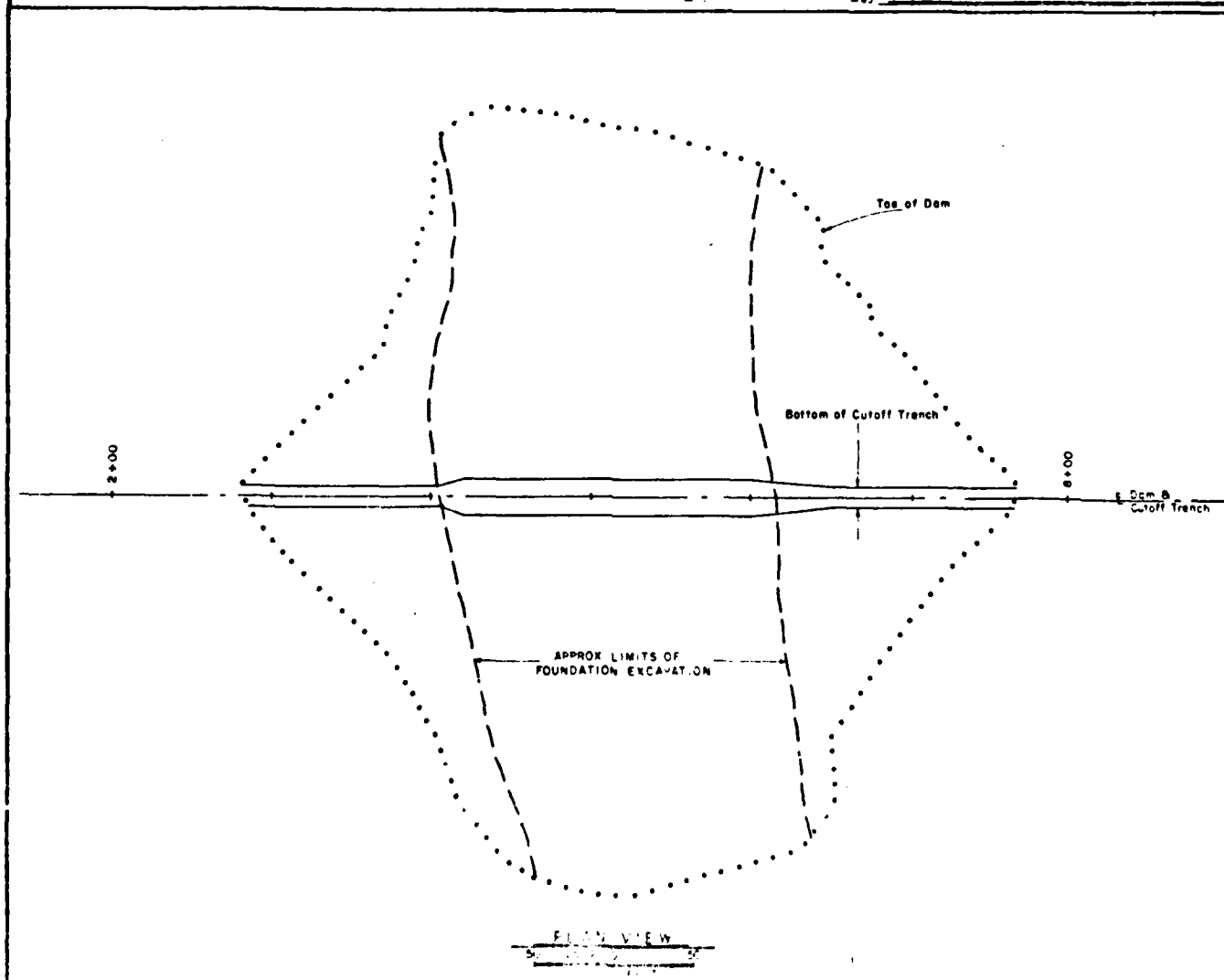
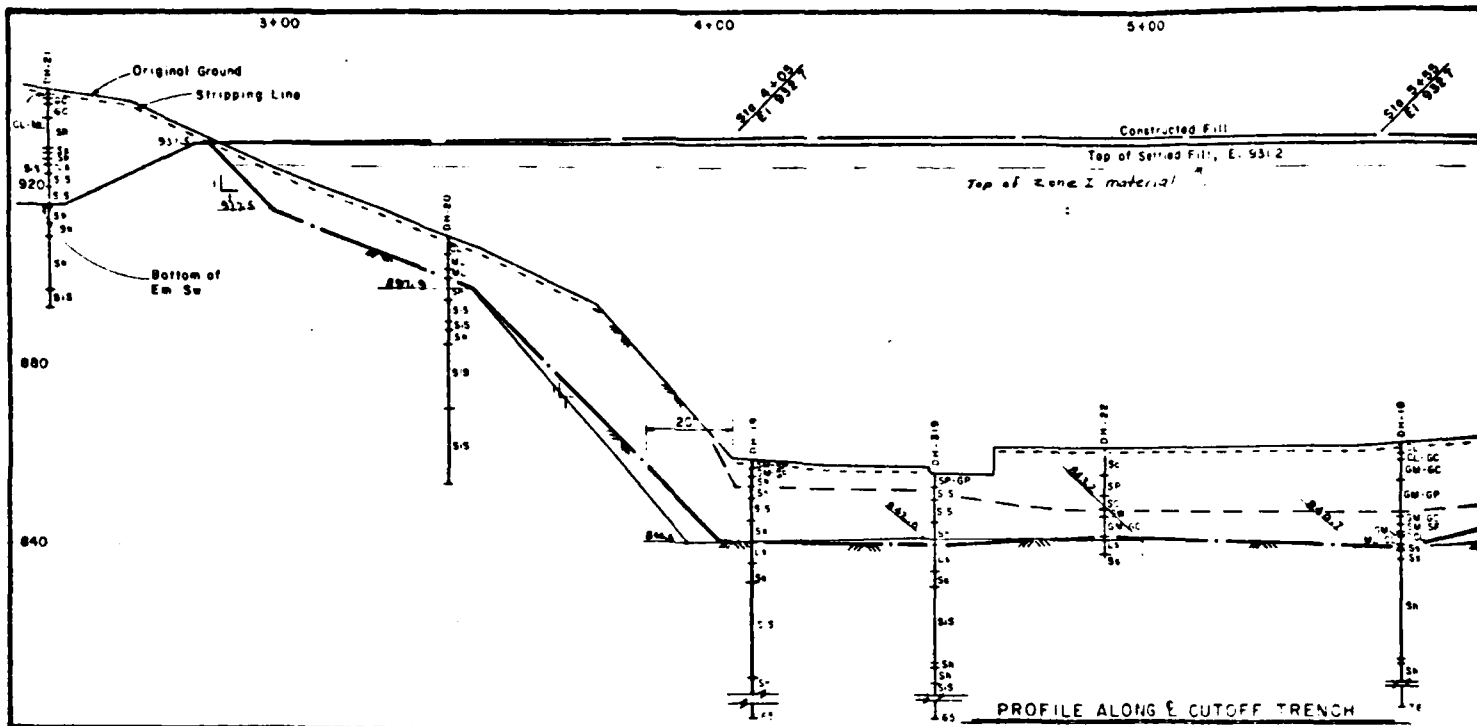
- 1] Maximum permissible lift thickness before compaction
- 2] Water content of fill matrix at time of compaction. Variation from water content shown may be approved by the Engineer
- 3] For typical compaction curves see sheets 51 and 52
- 4] For hand compacted backfill, the maximum rock size shall not exceed 3" & lift thickness shall not exceed 4"

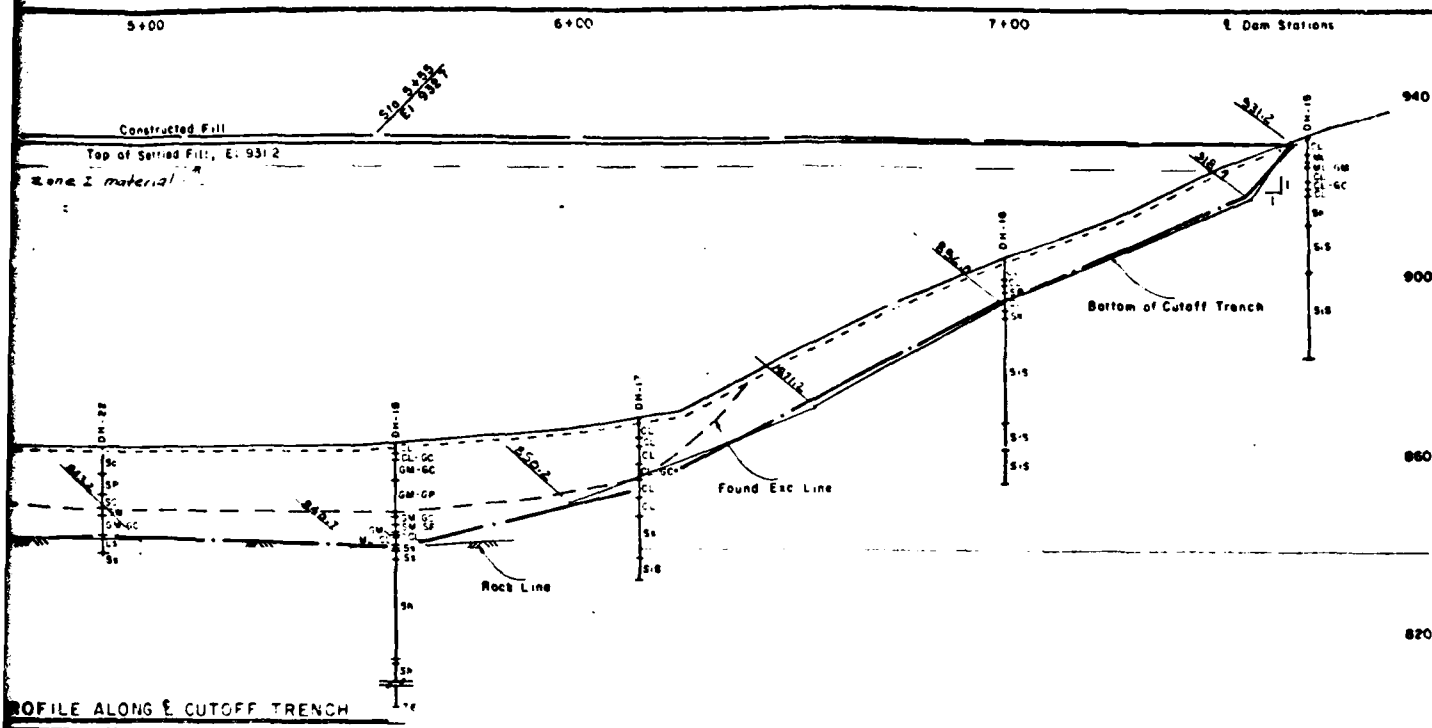
HARMON CREEK WATERSHED
FLOODWATER RETARDING DAM PA-485
ARDMINGTON COUNTY, PENNSYLVANIA
FILL PLACEMENT

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

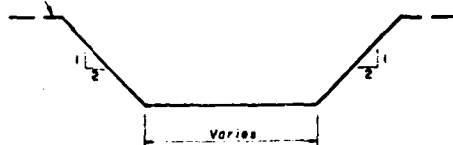
D. P. FAERBER 3-75
R. A. STULTZ 6-74
CRISE 9-75
PA-485-P

45 ENGINEERING





Stripping Line, Weathered Rock Line
or Found Exc Line



STATION	BOTTOM WIDTH
2+85 to 4+05	12
4+05 to 4+20	Transition
4+20 to 6+00	22
6+00 to 6+50	Transition
6+50 to 7+70	12

SECTION

CONSTRUCTION NOTES

1. E. Dam = E. Cutoff Trench
2. For logs of test holes see shts. 37 thru 50.
3. Rock treatment required in Cutoff Trench bottom as directed by the Engineer.
4. The depth of cutoff excavation shown is approximate. The final depth will be determined by the Engineer after examination of materials encountered.

PLATE 6

AS BUILT PLANS

HARMON CREEK WATERSHED
FLOODWATER RETARDING DAM PA-485
WASHINGTON COUNTY, PENNSYLVANIA

CUTOFF TRENCH

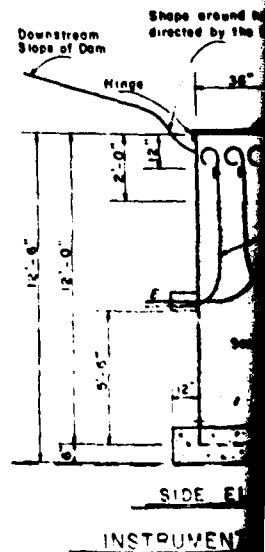
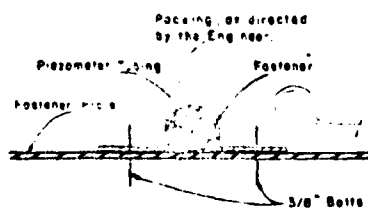
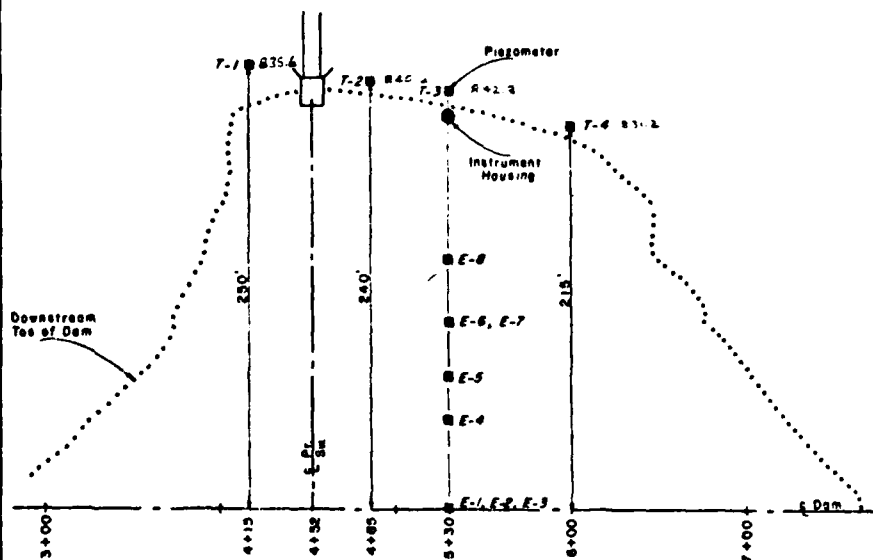
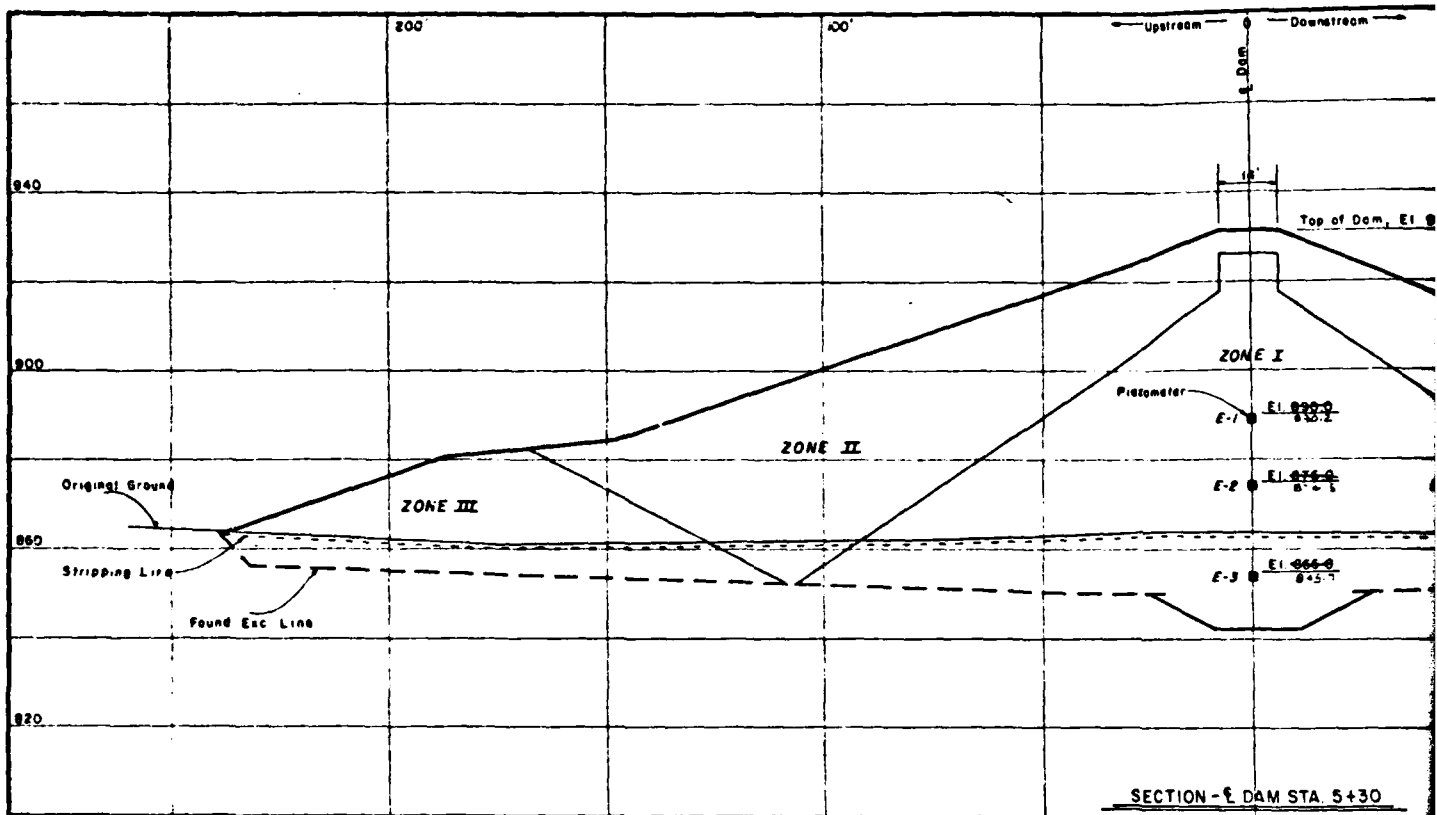
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

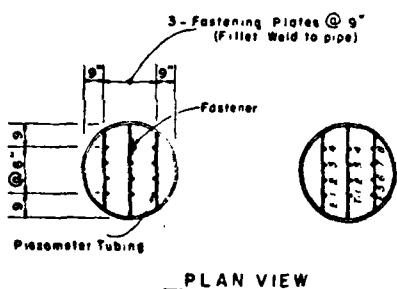
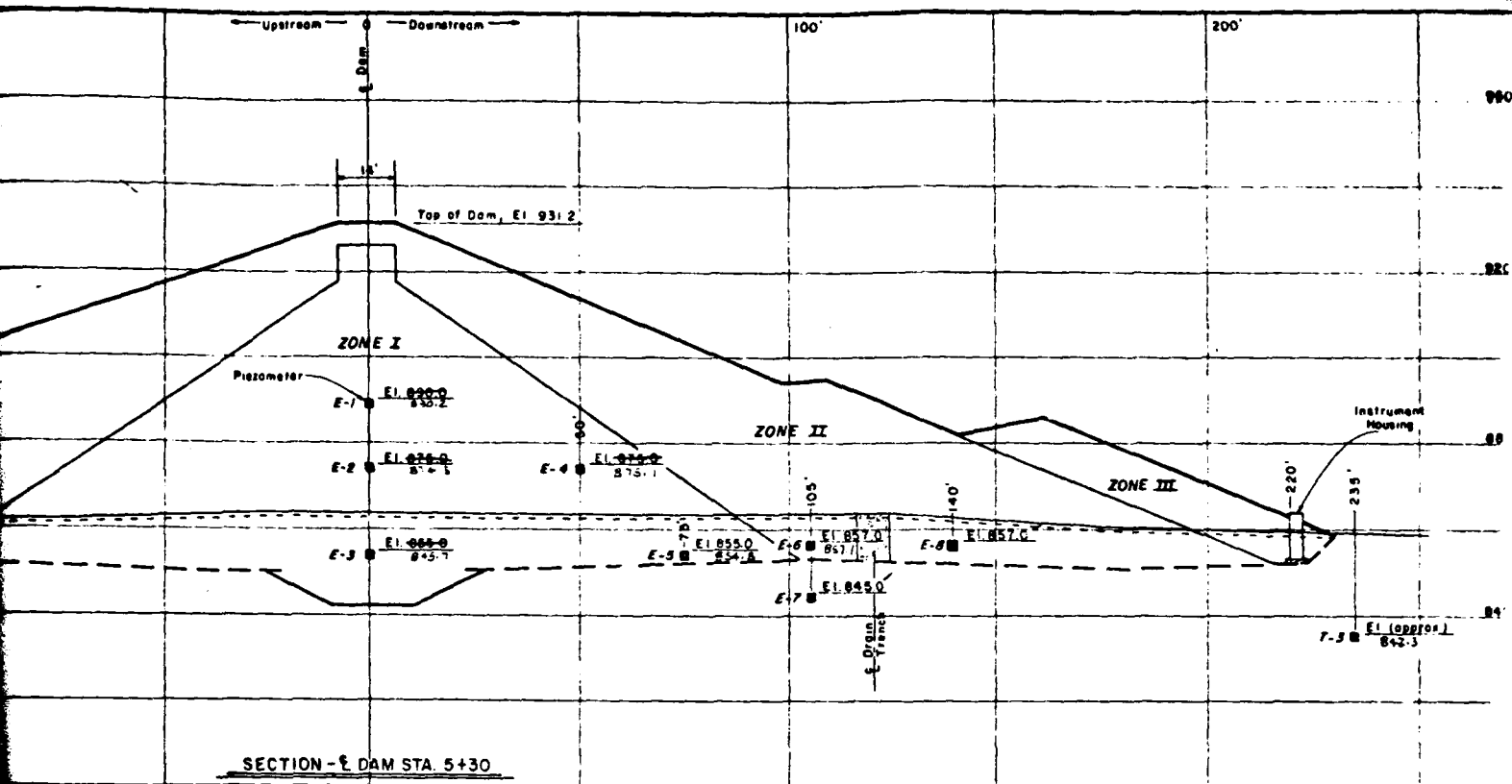
D. P. FAERBER 3-75

CHISE 4-75

PA-485-P

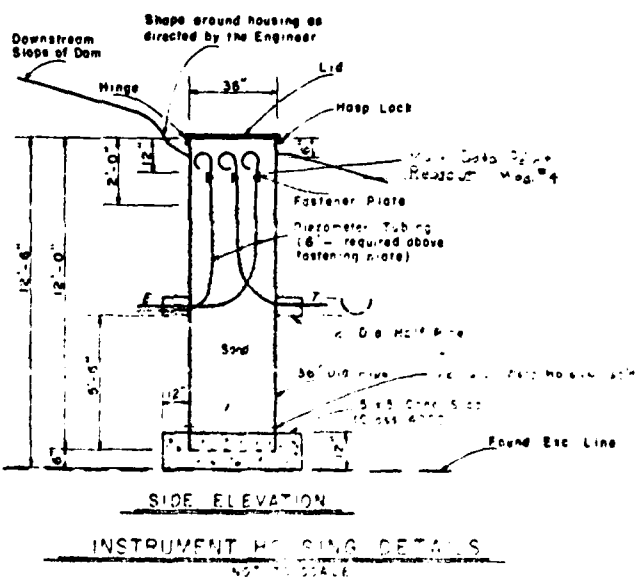
NO. 100-111-11-11





INSTRUMENT HOUSING BILL OF MATERIAL

ITEM	SIZE	LENGTH	QUANTITY
PIPE, Class I, Shape 1, 12 Gage (Spec 551)	36" dia	12'-0"	1
HALF PIPE, Class I, Shape 1, 16 Gage (Spec 551)	12" dia	12"	2
LID, Steel Sheet	1/4" x 36" x 6"	—	1
FASTENER PLATE, Galv	1/4" x 4"	Varies	3
FASTENER	1/2" dia	—	12
BOLTS, Galv, w/ Nuts and Washers	3/8" dia	1"	24
HASP LOCK	1 1/2" x 4"	—	1
HINGE (As Per Manufacturer Recommendations)	—	—	1
LOCK (Master - w/ 2 keys)	—	—	1



SAND (Fine Drain Fill - Gradation Limits SH-11)

CONCRETE (Class 4000)

2.5 Cu. Yds.

1.0 Cu. Yds.

PLATE 7 AS BUILT PLANS

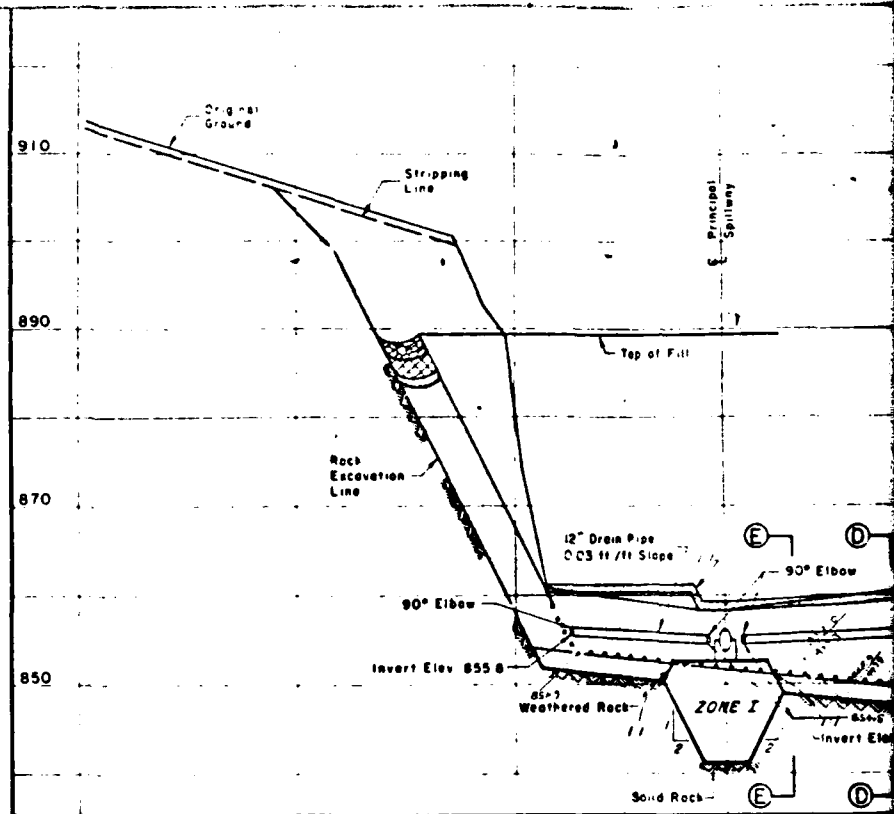
HARMON CREEK WATERSHED
FLOODWATER RETARDING DAM PA-485
WASHINGTON COUNTY, PENNSYLVANIA

PIEZOMETER INSTALLATION

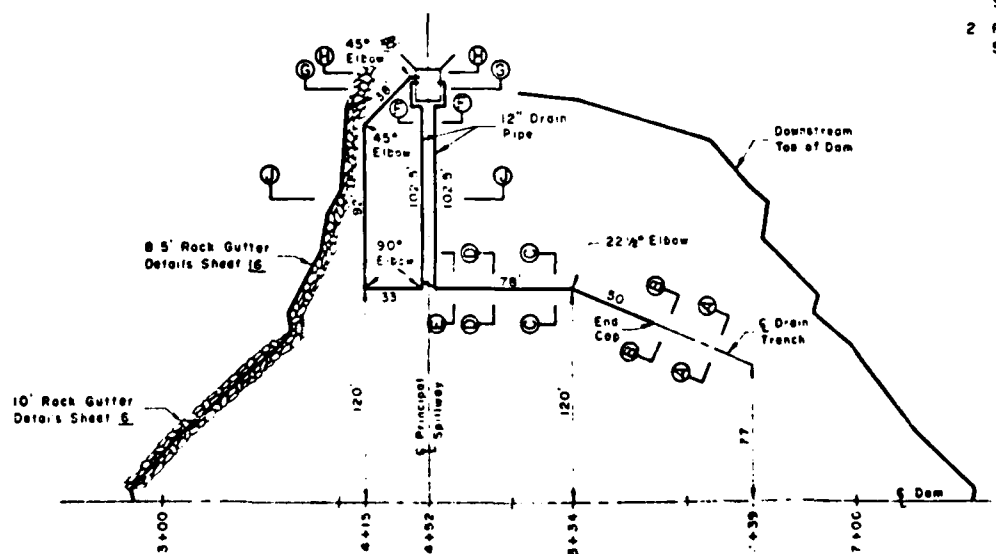
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

J. ZURLO
D. P. FAERBER 5-75
CRISE 5-75

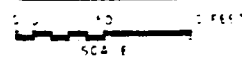
PA-485-P



PROFILE ALONG C

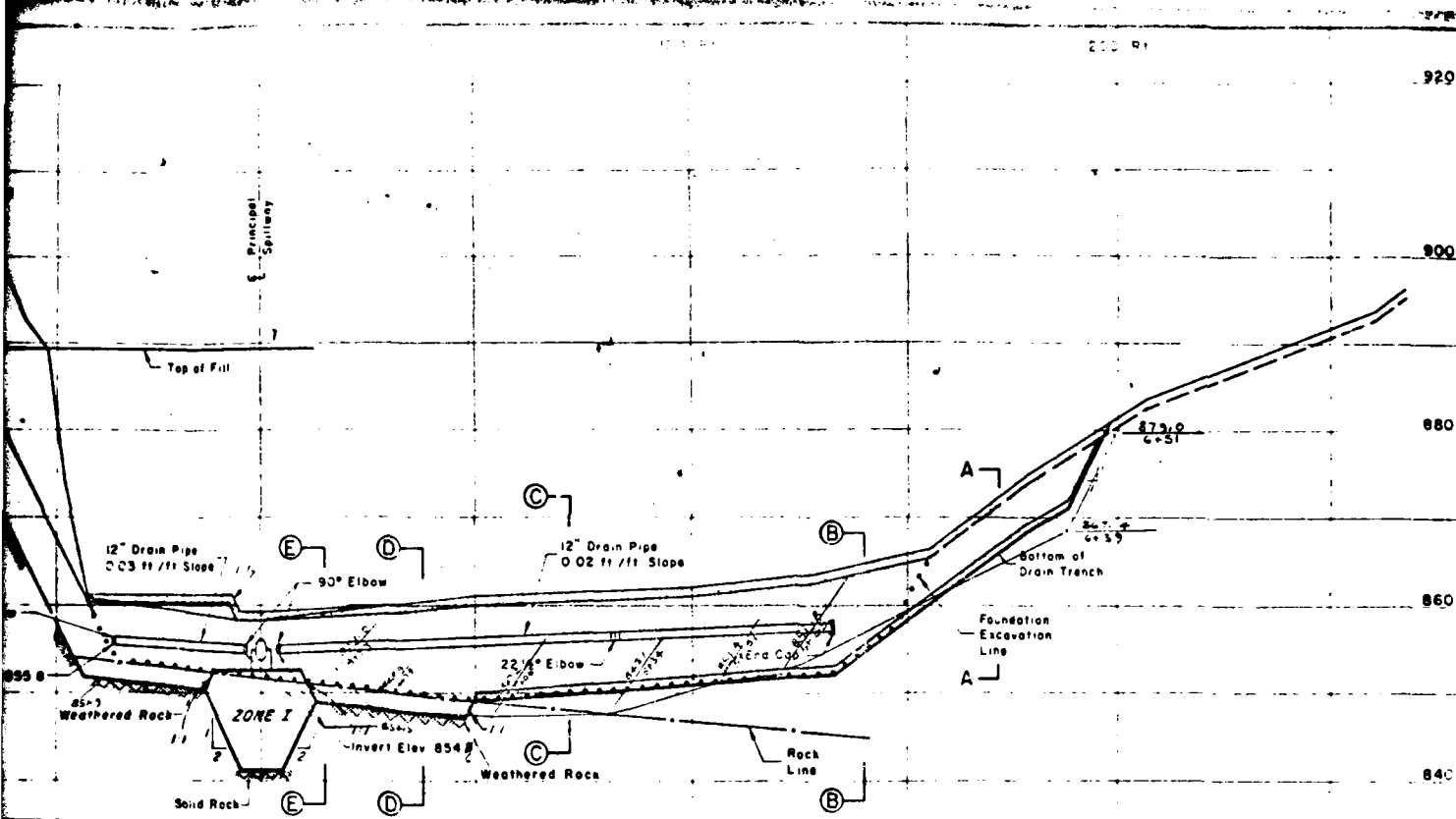


PLAN VIEW



NOTES:

- 1 All draw Shape 1.
- 2 For Sect Section



PROFILE ALONG CENTERLINE OF DRAIN TRENCH

FOUNDATION DRAIN PIPE QUANTITIES

- 553' - 644' - 12" Dia Drain Pipe includes
- 9 - 90° Elbows
 - 1 - 22 1/2° Elbow
 - 2 - 45° Elbows
 - 1 - Metal End Cap
 - 3 - Small Animal Guards (Details Sheet 32)

NOTES

- 1 All drain pipe shall be 12" Dia, Class I or II, Shape 1, Coating A, 16 Gage, Perforated (Spec 551)
- 2 For Sections A-A thru H-H see sheet 12, Section J-J see sheet 16

- Fine Drain Fill
- Coarse Drain Fill

COARSE DRAIN FILL
GRADATION LIMITS

SEIVE NO	% PASSING (Based on Dry Weight)
1 1/2"	100
1"	90 - 100
3/4"	25 - 60
No 4	0 - 10
No 8	0 - 5
No 200	< 3

PLATE 8

FINE DRAIN FILL
GRADATION LIMITS

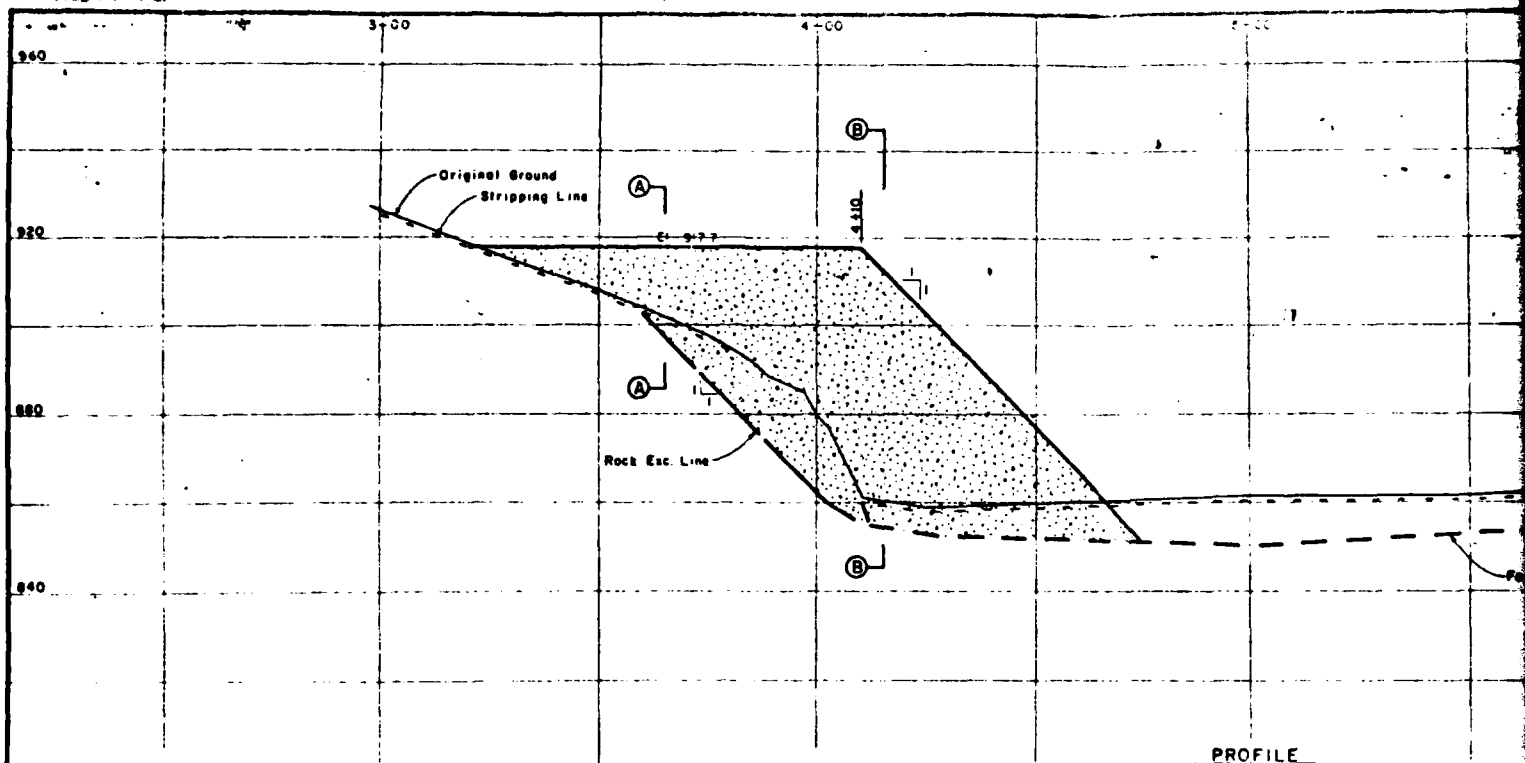
SEIVE NO	% PASSING (Based on Dry Weight)
3/8"	100
No 4	90 - 100
No 8	70 - 100
No 16	50 - 85
No 30	30 - 65
No 50	10 - 30
No 100	< 8
No 200	< 3

AS BUILT PLANS

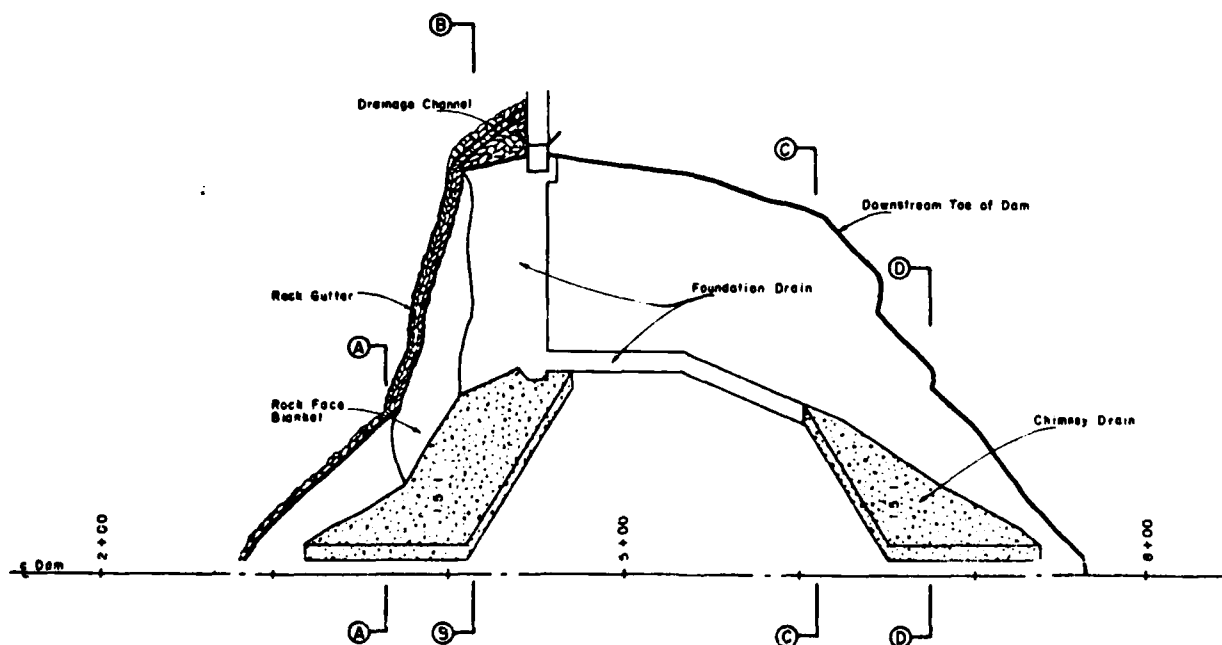
HARMON CREEK WATERSHED
FLOODWATER RETARDING DAM, PA-485
WASHINGTON COUNTY, PENNSYLVANIA
FOUNDATION DRAINAGE

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

DESIGNED BY	DATE	APPROVED BY
DRAWN BY	DATE	DATE
CHECKED BY	DATE	DATE
PROJECT NO.	PA-485-P	DATE

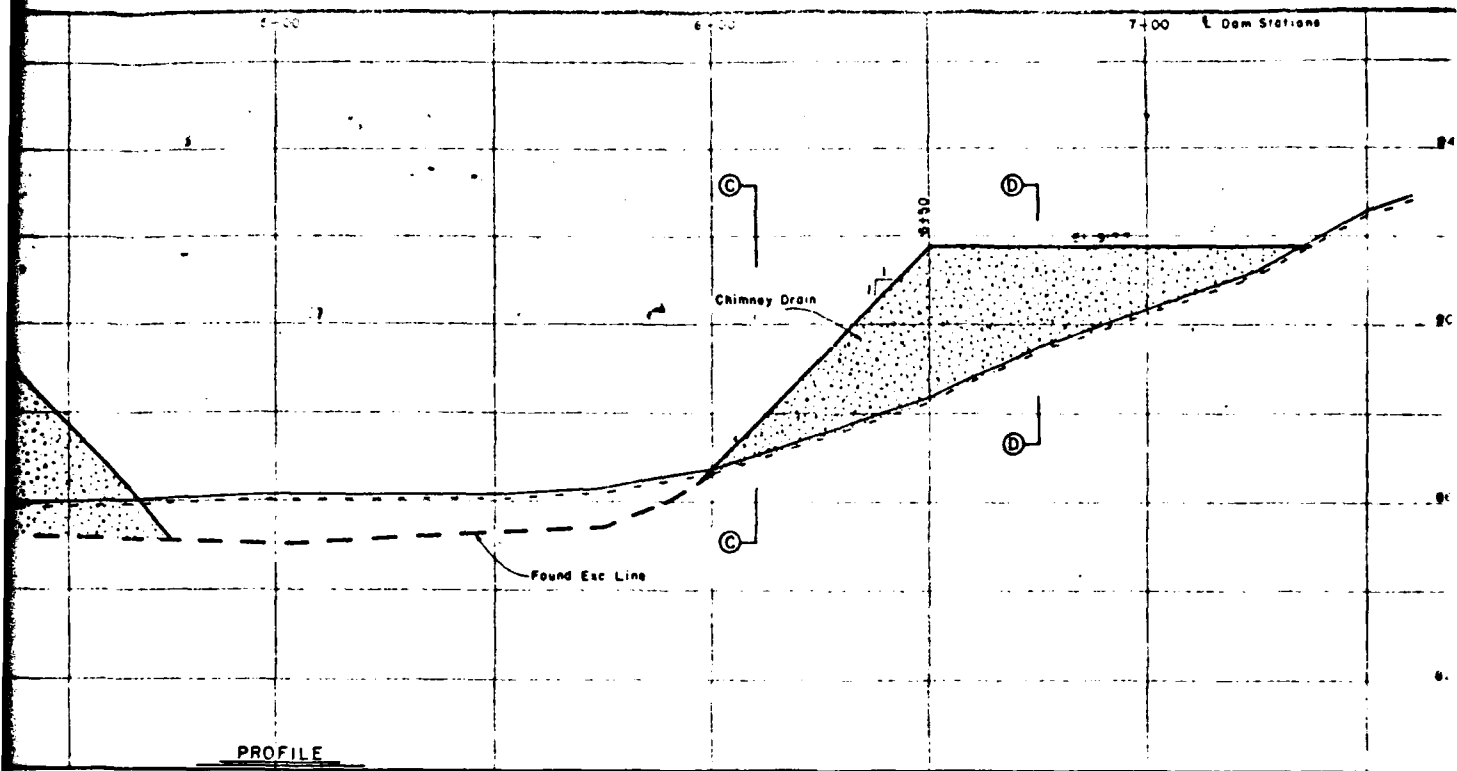


PROFILE

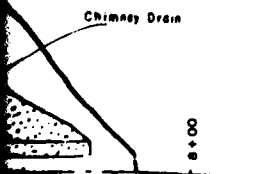


Section

PLAN VIEW
50 25 10 0 50
SCALE IN FEET



of Dam



Sections A-A thru D-D see SHTS. 14 & 15

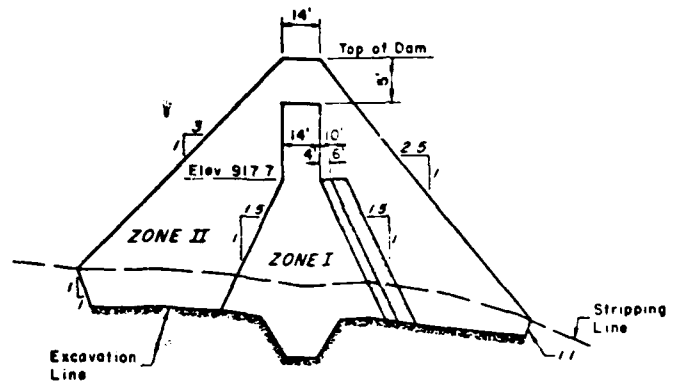
PLATE 9 AS BUILT PLANS

HARMON CREEK WATERSHED
FLOODWATER RETARDING DAM PA-485
WASHINGTON COUNTY, PENNSYLVANIA
CHIMNEY DRAIN

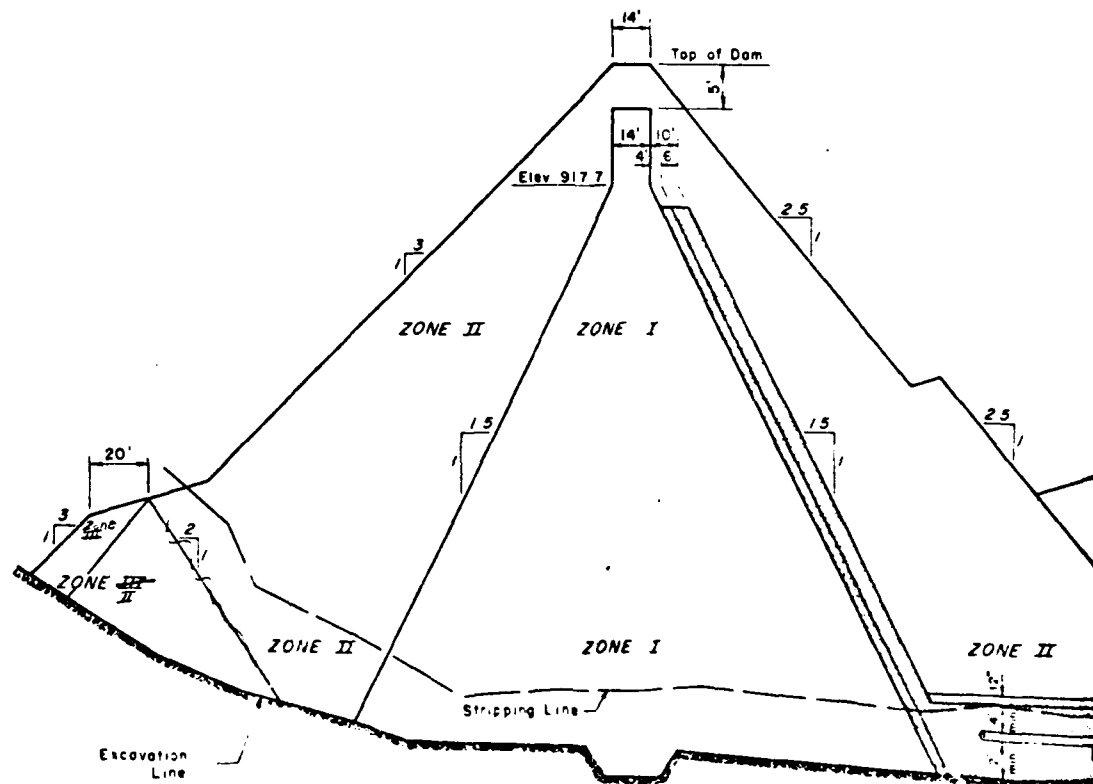
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

D. P. FAERBER 3-75
R. A. STALTER 4-75

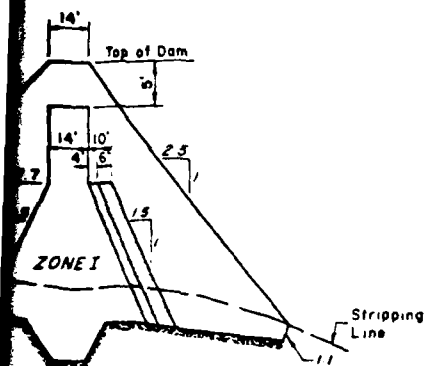
PA-485-P



CROSS-SECTION OF DAM AT & STATION 3+65
(SECTION A-A)



CROSS-SECTION OF DAM AT & STATION 4+15
(SECTION B-B)



DAM AT & STATION 3+65
SECTION A-A)

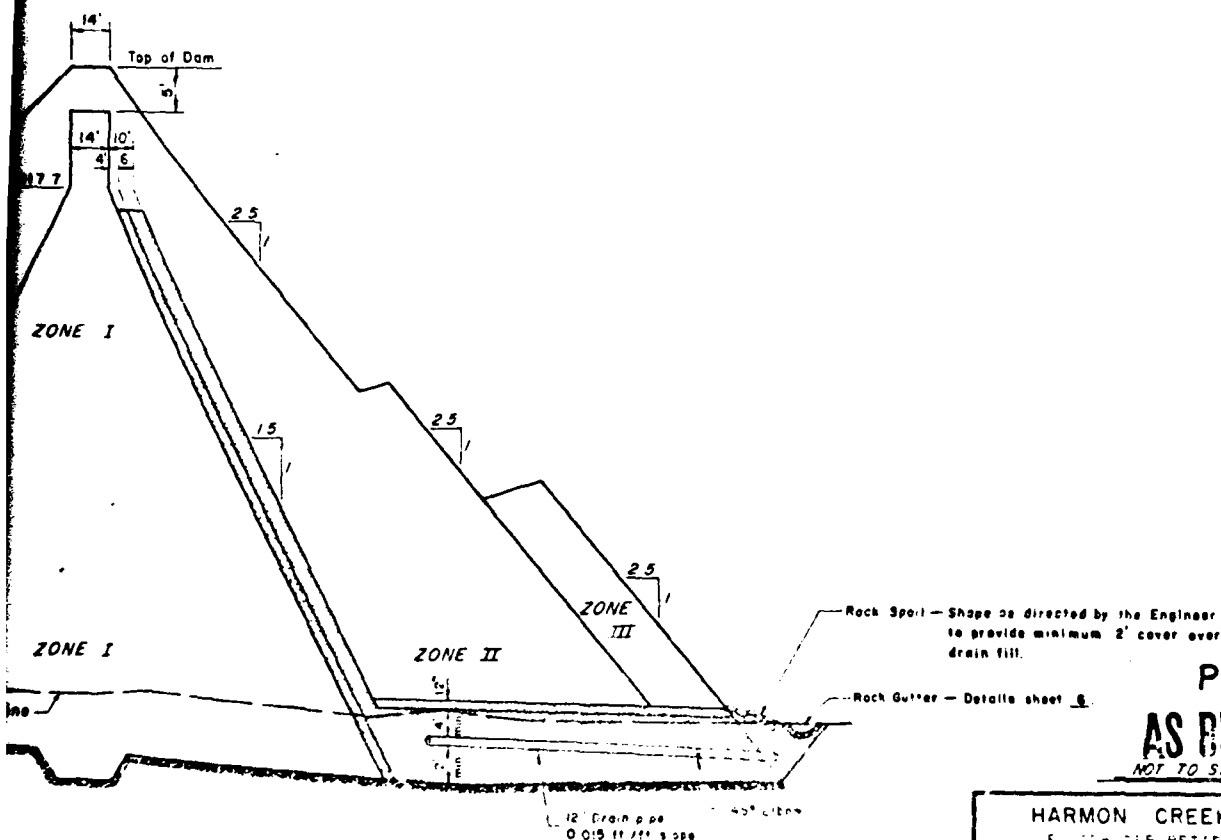


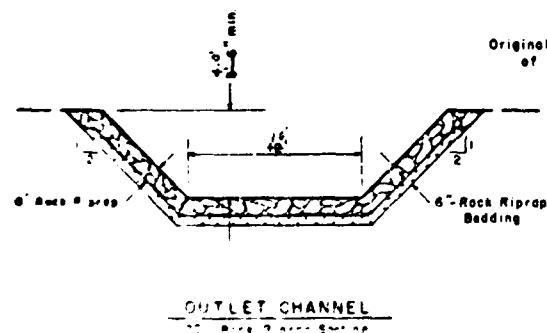
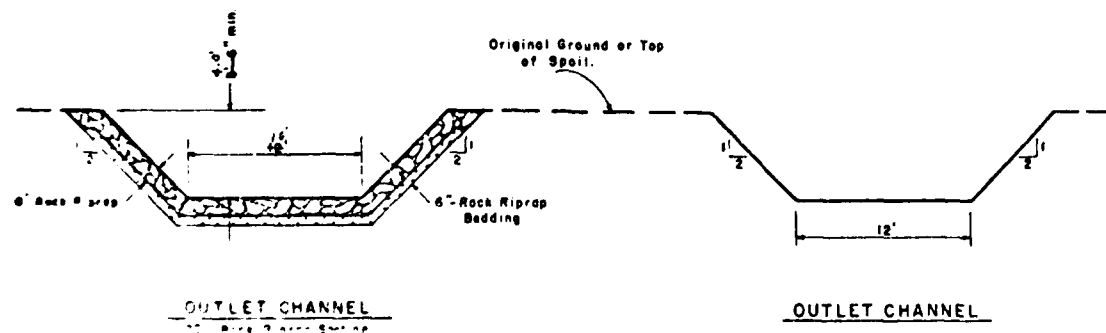
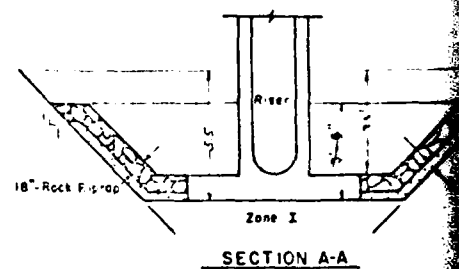
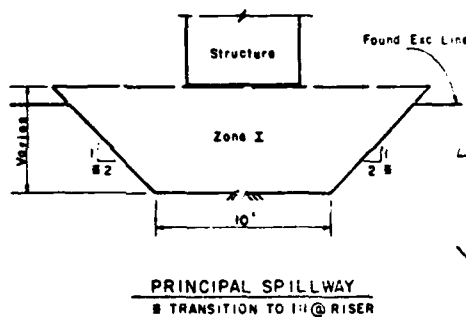
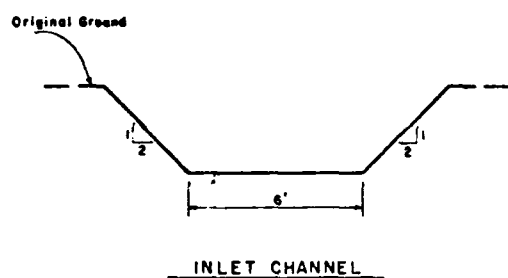
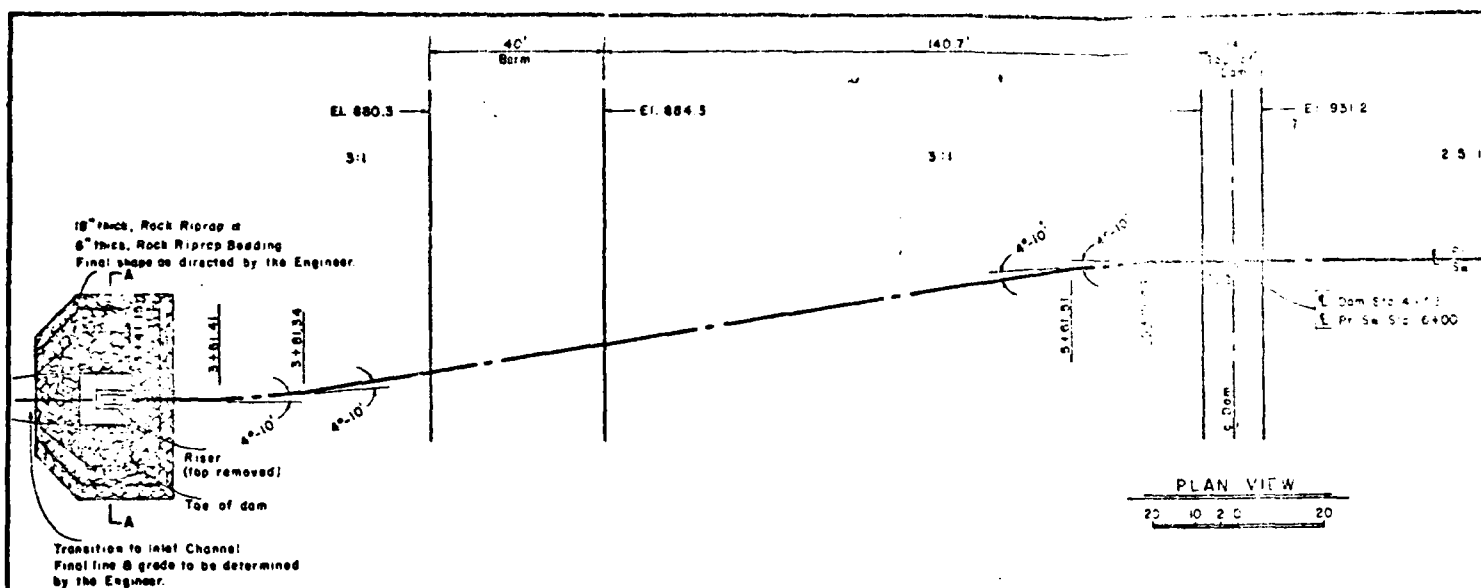
PLATE 10
AS BUILT PLANS
NOT TO SCALE

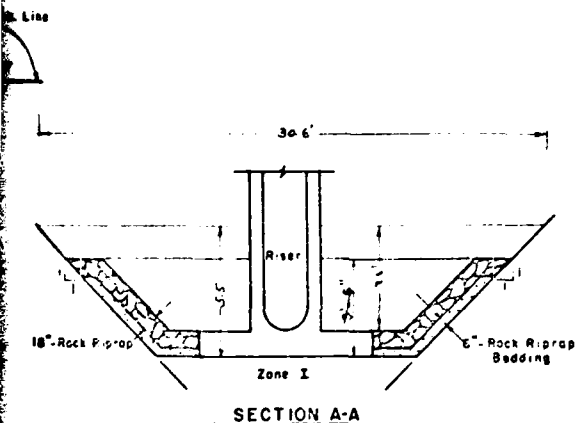
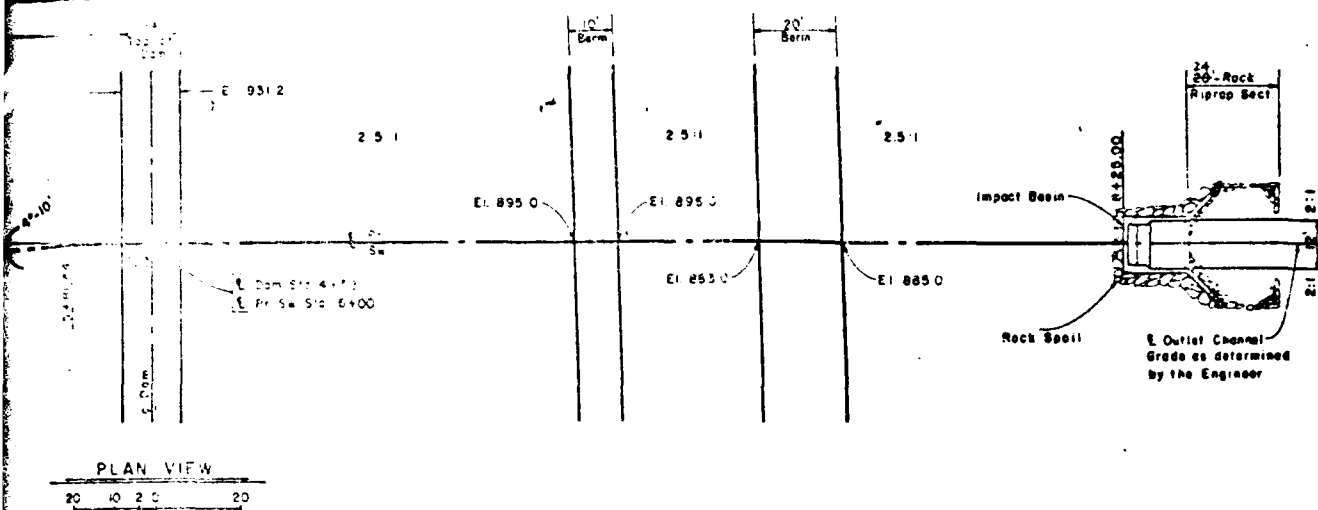
HARMON CREEK WATERSHED
FLOODWATER RETARDING DAM
WASHINGTON COUNTY, PENNSYLVANIA
CHIMNEY DRAIN (SECTIONS)

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

D. PFAERBER 3-75
R. A. STALTER 2-75

PA-485-





AS BUILT
30" I.D. PIPE JOINT DATA

JOINT	DIST FROM RISER WALL	INVERT EL.
J-1	0.33	852.70
J-2	1.00.5	852.43
J-3	19.97	852.37
J-4	29.97	852.37
J-5	79.97	852.34
J-6	32.72	852.32
J-7	12.65	852.34
J-8	32.57	852.09
J-9	29.49	852.04
J-10	78.41	852.07
J-11	99.33	852.00
J-12	29.15	852.32
J-13	29.27	852.43
J-14	159.23	852.34
J-15	279.81	852.34
J-16	232.73	852.55
J-17	218.45	852.34
J-18	238.57	852.15
J-19	258.49	852.34
J-20	275.41	852.77
J-21	293.31	852.43
J-22	418.25	852.43
J-23	425.92	852.34
J-24	445.64	852.34
J-25	465.76	852.00
J-26	485.48	852.32

AS BUILT COLLAR DATA
FOR 30" I.D. PIPE

COLLAR	DIST FROM RISER WALL	INVERT EL.
1	2.1	
2	4.5	
3	1.2	
4	0.2	
5	11.6	
6	32.8	
7	1.3	
8	18.5	
9	2.1	
10	23.4	
11	25.5	
12	22.1	
13	2.0	
14	22.6	
15	35.1	

30" I.D. Reinforced Concrete Pressure Pipe
Steel Cylinder Type, Spec 541 (AWWA C-301)

- 404' - Straight Sections
- 40' - Bevel Left Sections, 4"-10" (2)
- 40' - Bevel Right Sections, 4"-10" (2)
- 1 - Spigot Wall Fitting (for 15' wall)
- 484' - Total (provide with deep joints)

CONSTRUCTION NOTES

- Outlet end of pipe to be finished so that no metal is exposed.
- Pipe layout data to be furnished by the Engineer.
- Rock treatment required on exposed rock as directed by the Engineer.
- Plan View - Give for all lengths of conduit of 15' length or other combinations of conduit are used, rebar and bedding to be provided by the Engineer.
- Riprap bedding shall meet gradation limits for fine drain fill (see spec).

PLATE II AS BUILT PLANS

HARMON CREEK WATERSHED
FLOODWATER RETAINING DAM, PA-485
WASHINGTON COUNTY, PENNSYLVANIA

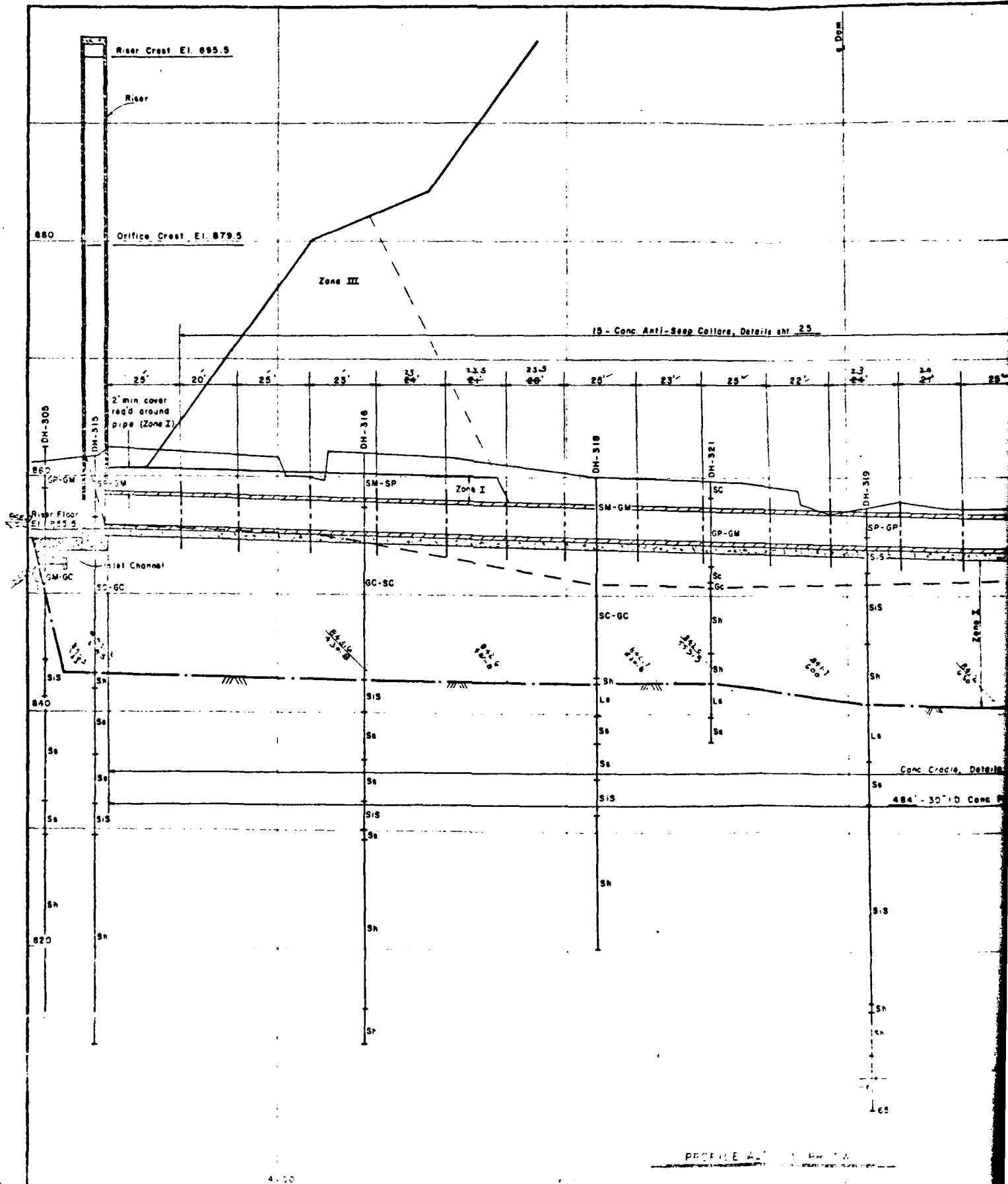
PRINCIPAL SPILLWAY

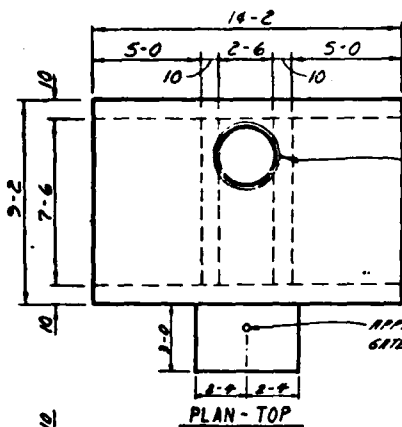
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

D. P. FAERBER 3-75

R. A. Stoller 3-75

PA-485-P



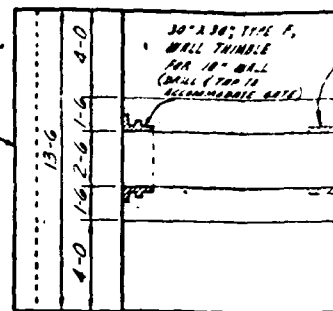


Manhole Frame & Cover
Details SHT 32

APPROX. LOCATION OF
GATE STEM SLEEVE

PLAN - TOP

SEWER PAD
DETAILS SHT 22



Spigot Wall Fitting
Details SHT 25

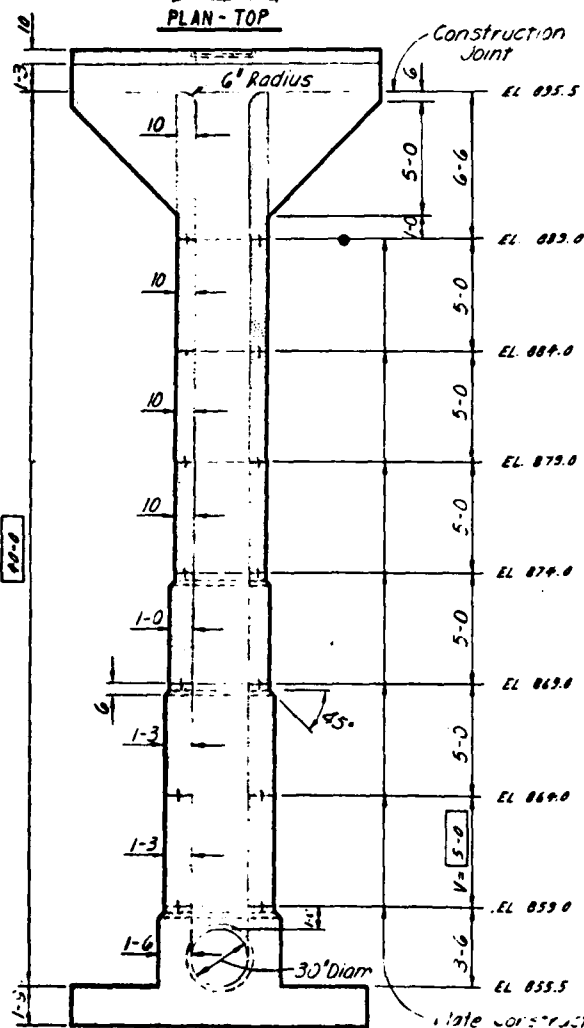
SECTION B-B

15'-6" X 12'-0" X 18'-0" PREPARED
JOINT FILLER, BITUMINOUS.
(SING. 535)

GATE LIFT SUPPORT
DETAILS SHT 21

CONSTR. JOINT

- 1/4" x 6" Carbon steel plate,
to conform to Spec. 581
Continuous thru constr. joint.
Splices shall be either:
1. Bolt welded
2. Lapped 3" and bolted
3. Lapped 3" and fillet welded

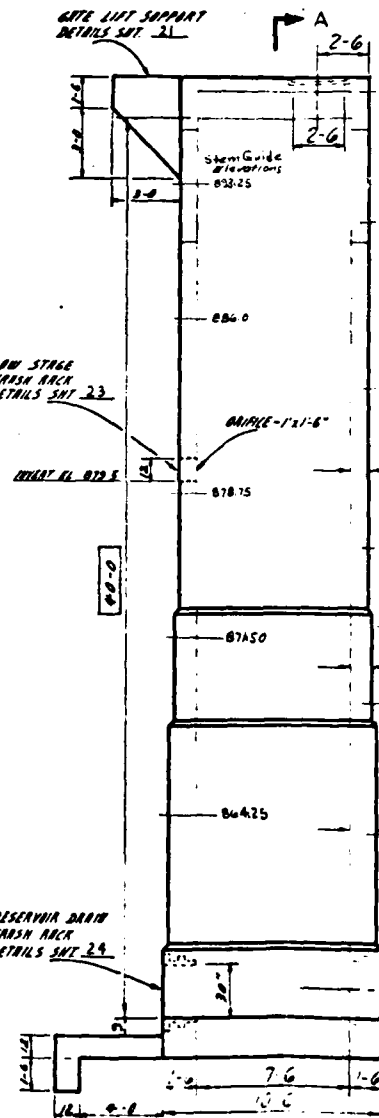


SECTION A-A

LOW STAGE
TRASH RACK
DETAILS SHT 23

TRASH EL 875.5

RESERVOIR DRAIN
TRASH RACK
DETAILS SHT 24



SIDE ELEVATION

885.9 - Ladder Brackets
Elevations

884.4

878.5

874.9

PLATE CONSTR. JOINT

870.4

864.25

860.4

855.5

850.4

845.5

840.4

835.5

830.4

825.5

820.4

- CONSTRUCTION IN
1. Bar dimen
2. Radius of
3. The 2' and
4. Portland Cem
be used.
5. All exposed &
a. Shore - 1000
NOTE:
1. IN LADDER
2. SLIDE 600

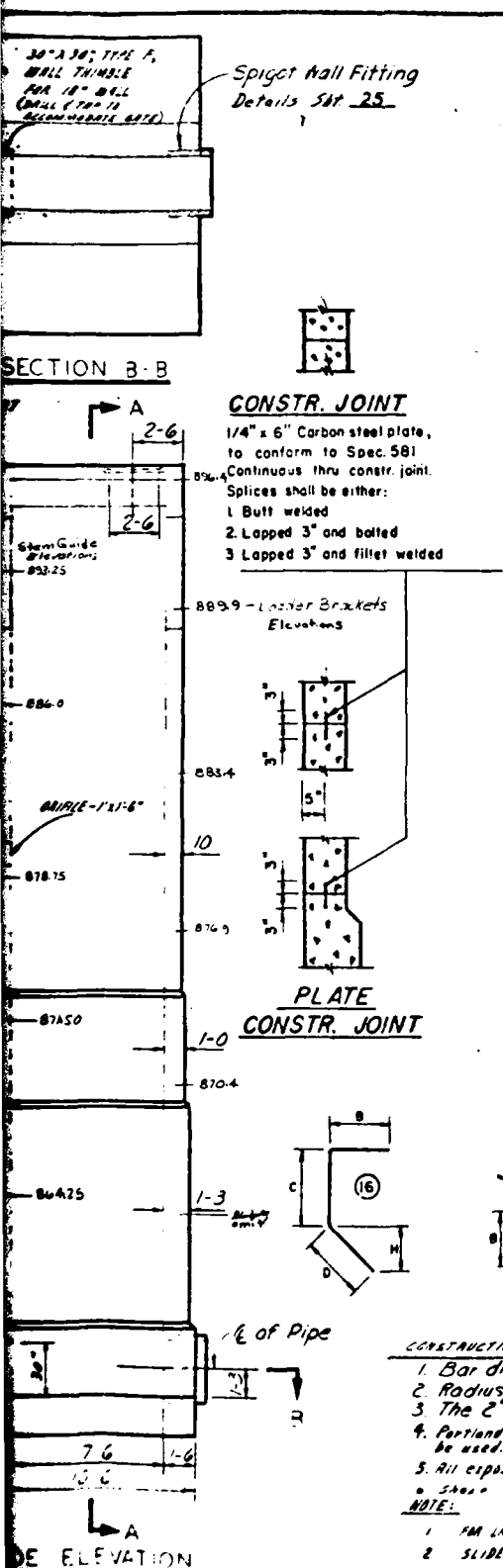
QUANTITIES

#4 Bars	958-6	Lin. Ft	640.3 LBS
#5 Bars	2,011-6	Lin. Ft	2,011.6 LBS 18160
#6 Bars	2,072-10	Lin. Ft	2,072.1 LBS
#7 Bars	988-9	Lin. Ft	2,080.2 LBS
		Total	10,851 LBS.
	3717.0		

Total Concrete =

56.2
55.2 Cu Yds.

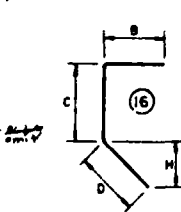
STANDARD COVERED RISER			
DESIGN CONSTANTS	$f'_c = 4500$ psi	$f_c = 1600$ psi	
	$n = 8$	$f_s = 20,000$ psi	
STANDARD DWS. NO	ES 3030		
DATE	6-11	SHEET	OF 4



STEEL SCHEDULE															
Mark	Size	Quantity	Length	Type	B	C	Total Length	Mark	Size	Quantity	Length	Type	B	C	Total Length
B1	#7	15	2-0	1			30-0	R29	#5	24	3-3	1			162-
R2	#6	12	0	1			165-0	R30	#5	20	5-0	21	2-9	5-3	160-
B3	#7	40	0	21	3-8	4-4	320-0								
B4	#6	12	0	1			40-0								
B5	#6	10	0	1			120-0								
B6	#6	4	5-9	1			23-0								
B7	#6	7	5-6	21	1-2	4-4	28-3	T1	#5	18	2-0	1			108-
B8	#6	19	7-9	21	1-0	5-9	27-3	T2	#5	6	8-0	1			48-
B9	#6	14	8-6	1			119-0	T3	#5	4	4-9	1			19-
B10	#6	5	3-6	1			17-6	T4	#5	4	3-6	1			14-
B11	#6	3	2-6	1			7-6	T5	#5	4	2-3	1			9-
B12	#6	2	2-6	1			5-0	T6	#5	4	9-0	19	2-0	7-0	36-
B13	#6	6	4-4	1			26-0	T7	#5	12	8-3	1			99-
B14	#7	20	4-8	1			23-4	T8	#5	2	3-3	1			6-
B15	#6	10	7-3	21	1-1	6-2	72-6	T9	#5	2	5-9	1			11-
B16	#6	14	9-9	21	3-2	6-1	133-6	T10	#5	2	10-9	1			21-
B17	#6	4	9-3	21	3-4	5-11	37-0	T11	#5	2	13-3	1			26-
								T12	#5	14	6-3	1			87-
								T13	#5	6	8-0	1			48-
								T14	#5	4	6-0	1			24-
R1	#6	22	12-0	1			264-0	T15	#5	4	4-9	1			19-
R2	#5	20	8-6	1			170-0	T16	#5	4	3-6	1			14-
R3	#6	12	3-6	1			35-0	T17	#5	4	2-3	1			9-
R4	#6	28	2-6	1			256-0	T18	#5	4	9-0	19	2-0	7-0	36-
R5	#7	40	9-6	21	3-6	6-0	380-0	T19	#5	24	8-0	21	2-9	5-3	92-
R6	#4	20	8-6	1			170-0	T20	#5	2	3-3	1			6-
R7	#6	10	3-6	1			35-0	T21	#5	2	5-9	1			11-
R8	#6	26	4-0	1			104-0	T22	#5	2	2-3	1			16-
R9	#6	36	9-3	21	3-4	5-11	333-0	T23	#5	2	5-9	1			21-
R10	#6	4	8-9	21	3-1	5-8	35-0	T24	#5	2	3-3	1			26-
R11	#5	22	6-9	1			146-0	T25	#5	4	13-9	1			55-
R12	#5	20	8-3	1			165-0	T26	#5	4	13-9	1			55-
R13	#5	10	3-6	1			35-0	T27	#4	14	8-3	1			115-
R14	#5	30	4-6	1			135-0	T28	#4	2	4-9	1			9-
R15	#5	24	3-8	1			76-0	T29	#4	7	13-3	1			96-
R16	#6	36	8-9	21	3-1	5-8	315-0	T30	#4	4	5-3	1			21-
R17	#6	4	8-3	21	2-10	5-4	33-0	T31	#5	24	6-9	21	1-6	5-3	162-
R18	#5	24	11-9	1			282-0	T32	#5	2	6-6	21	1-6	5-0	13-
R19	#5	20	8-3	1			165-0	T33	#5	2	2-6	21	1-6	1-0	5-
R20	#5	8	3-3	1			26-0	T34	#5	7	3-9	1			96-
R21	#5	24	11-9	1			282-0	T35	#5	4	5-3	1			21-
R22	#6	40	8-3	21	2-10	5-4	331-0								
R23	#5	14	8-3	1			15-6	T36	#5	15	17-0	1			195-
R24	#5	87	3-3	1			229-0	T37	#5	14	6-6	21	4-6	2-0	91-
R25	#4	40	7-9	21	2-7	5-2	310-0	T38	#5	14	5-9	21	4-3	1-6	80-
R26	#5	24	6-9	1			162-0	T39	#5	12	4-0	1			48-
R27	#5	8	8-3	1			66-0	T40	#6	9	6-8	17	3-4	2-3	60-
R28	#5	8	3-3	1			26-0	T41	#6	11	12-11	16	4-3	1-6	146-

CONSTR. JOINT
 1/4" x 6" Carbon steel plate,
 to conform to Spec. 581
 Continuous thru constr. joint.
 Splices shall be either:
 1. Butt welded
 2. Lapped 3" and bolted
 3. Lapped 3" and fillet welded

**PLATE
 CONSTR. JOINT**



- CONSTRUCTION NOTES:**
1. Bar dimensions are out to out of bar
 2. Radius of bends equals 3 bar diameters for sizes equal to or less than #7.
 3. The 2" and 3" dimensions from face of concrete to steel are clear distances.
 4. Portland Cement Type I or II, with an air-entraining admixture, shall be used.
 5. All exposed edges of concrete to have a 1" chamfer, unless otherwise shown.
- NOTE:**
1. PM LADDER AND GATE ARE 2010.0 SEE SAT 2200.0
 2. SLIDE GATE NOTES SAT 2200.0

BAR TYPES

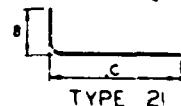
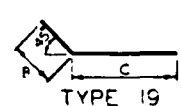
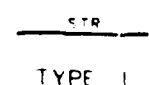


PLATE 13

0 2 4 AS PUILT
 Scale in feet

HARMON CREEK WATERSHED
 FLOODWATER RETARDING DAM PA-485
 WASHINGTON COUNTY, PENNSYLVANIA
 RISEP

**U. S. DEPARTMENT OF AGRICULTURE
 SOIL CONSERVATION SERVICE**

D. P. FAERBER 4-75

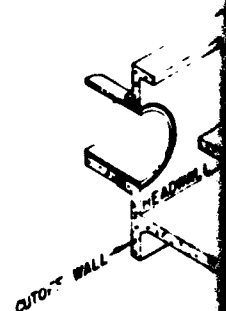
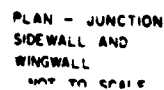
PA-485-P

640.3 Lbs
 320.1 Lbs
 7.15.0 Lbs
 320.6 Lbs
 10.22.1 Lbs
 10.85.1

51.2
 5.8 Cu. Yds.

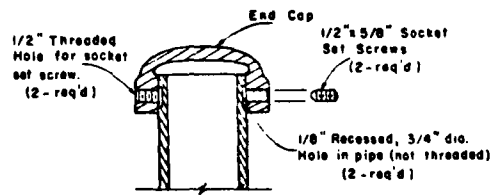
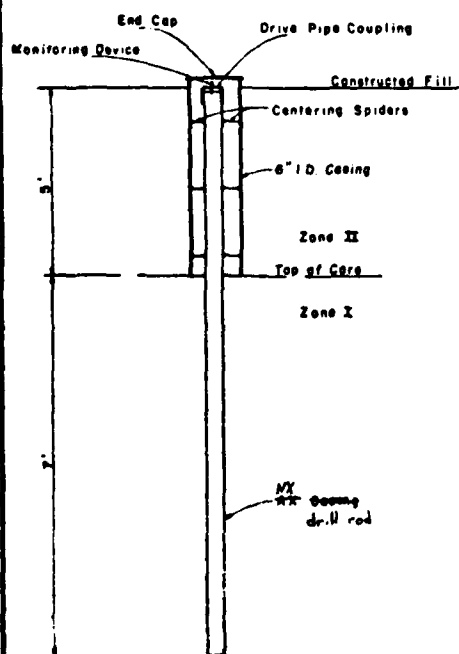
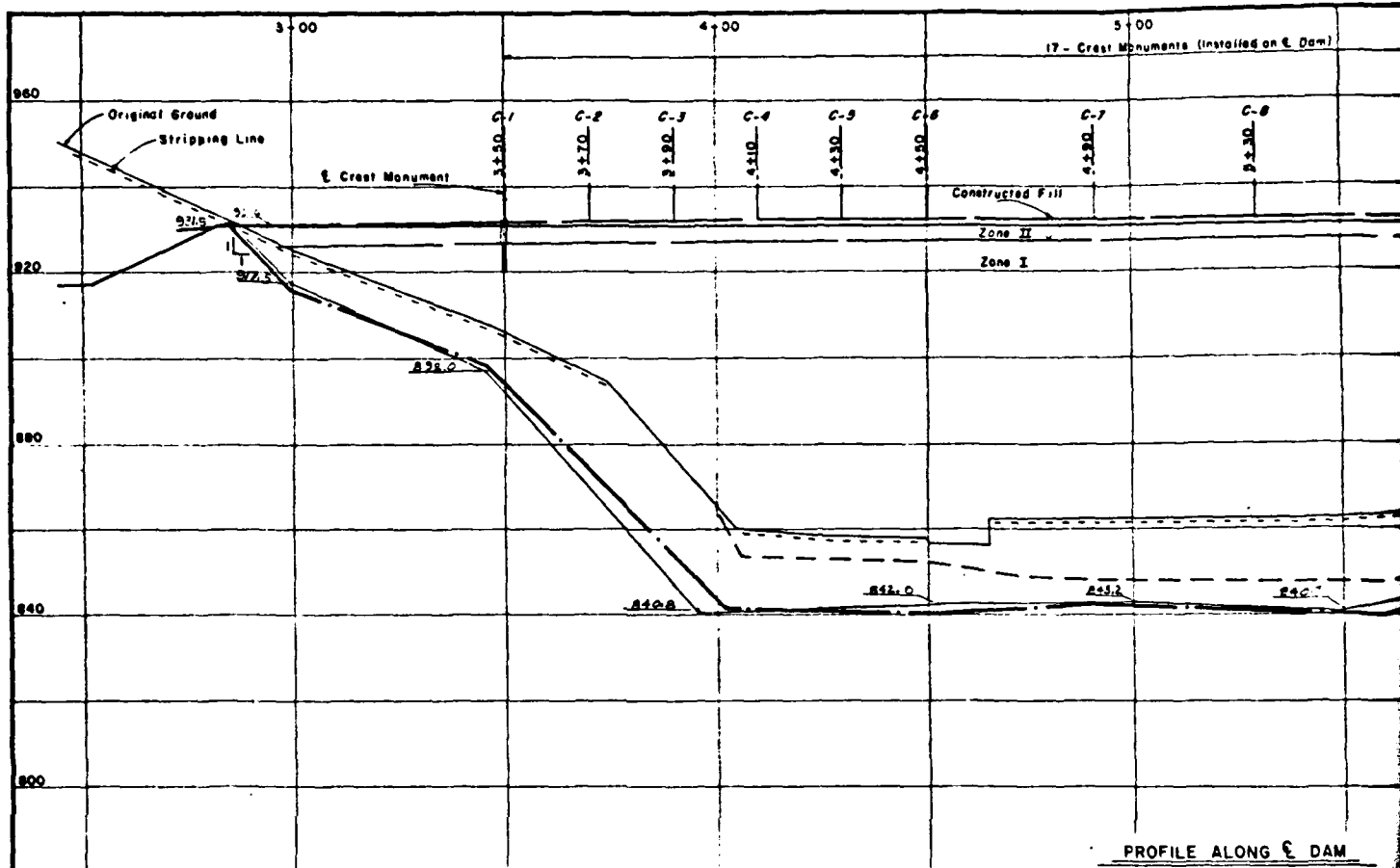


NOT TO SCALE

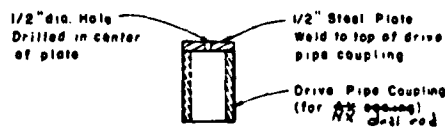


CARL RONDE
Consulting Engineer
654 Ridgeway Rd Lake Oswego, Ore

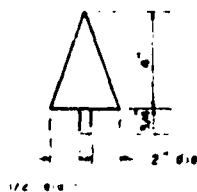
1 0 5 10
SCALE IN FEET
EXCEPT AS NOTED



END CAP

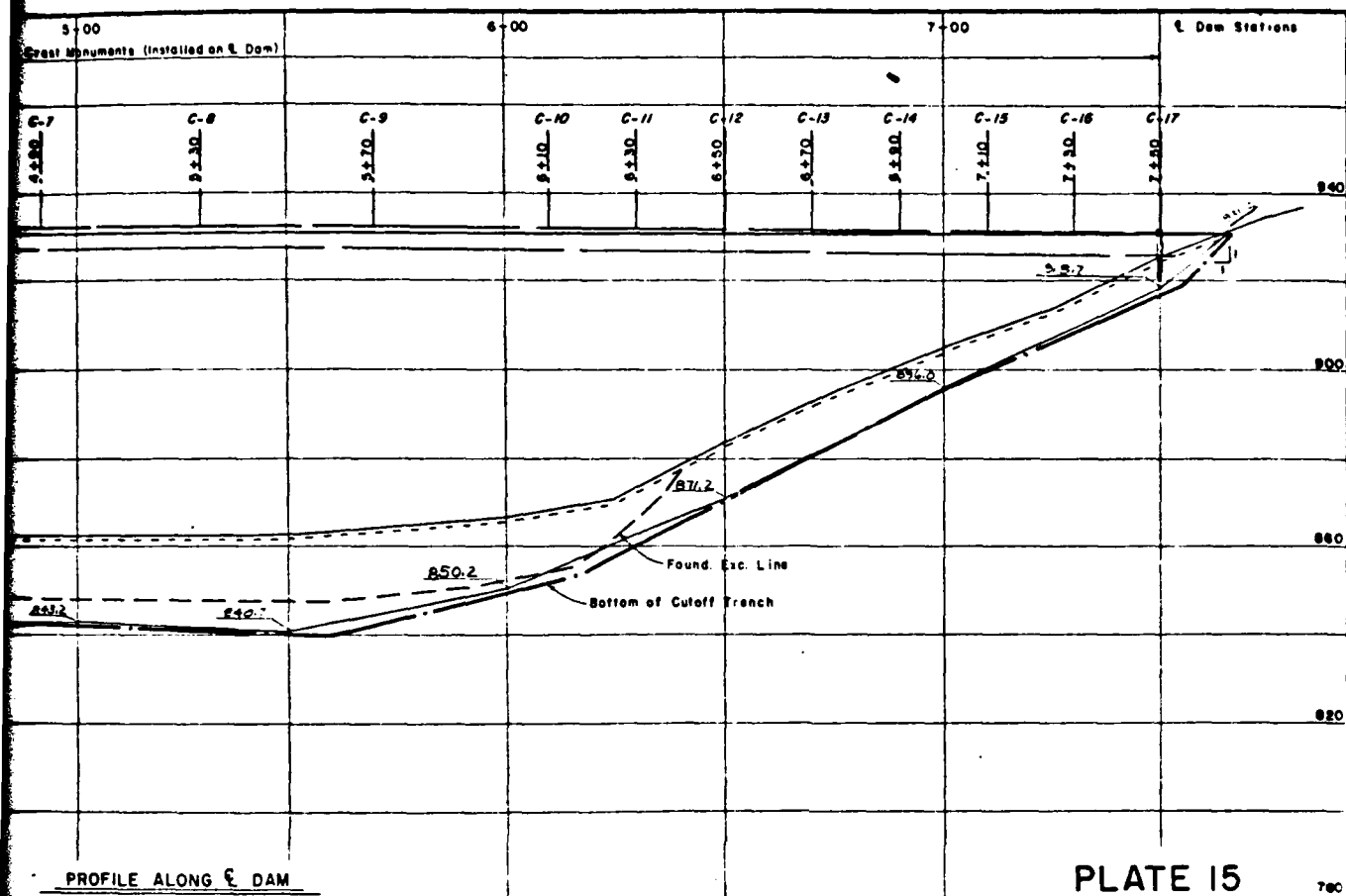


DRIVE PIPE COUPLING



MONITORING DEVICE
(BRASS)

CREST MOUNTAIN BILL OF MATERIALS	
ITEM	SIZE
CASING	6" I.D.
CASING Dr-11 Rods	WX
END CAPS	6" I.D.
DRIVE PIPE COUPLINGS	WX
MONITORING DEVICE	2" I.D.
CENTERING SPIDERS	—



CREST MONUMENT
BILL OF MATERIALS

ITEM	SIZE	LENGTH	QUANTITY
CASING	6" I.D.	5'-0"	17
CASING Dr. H. Rods	NK**	12'-0"	17
END CAPS	6" I.D.	—	17
DRIVE PIPE COUPLINGS	** NK	—	17
MONITORING DEVICE	2" I.D.	—	17
CENTERING SPIDERS	—	—	As Needed

INSTALLATION NOTES:

- 6" dia. casing to be seated to top of core (Zone 1 fill).
- 6" casing to be cleaned out to top of core.
- Flush coupled ~~to~~ casing with flush drive shoe to be centered in 6" casing and driven vertically 7' into core material.
- Standard driving equipment shall be used.
- The contractor shall arrange his activities such that:
 - Immediately after installation of each crest monument, the monitoring device shall be installed and elevations of each monument determined to the nearest .01'.
 - Upon installation of individual crest monuments after Monument #1, the monitoring device shall be installed and the horizontal distance to the previous monument shall be determined to the nearest 0.005'.
- All monuments are to be constructed on the centerline of dam.
- Crest monument shall be installed true and plumb.
- Centering Spiders shall be removed after monument installation is complete.
- Monitoring Devices shall be die punched 1 thru 17.

AS BUILT PLANS

HARMON CREEK WATERSHED
FLOODWATER RETARDING DAM PA-485
WASHINGTON COUNTY, PENNSYLVANIA

CREST MONUMENT INSTALLATION

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

D. P. FAERBER 5-75

CRISE 5-75

1760

5-20

33

02

PA-485-P

U.S. D.A. 111 R. Rev. 7-57

APPENDIX F

REGIONAL GEOLOGY

REGIONAL GEOLOGY

PA 485 is located in the Pittsburgh Plateaus Section of the Appalachian Plateaus Physiographic Province. Bedrock units below the dam are contained in the Glenshaw formation of the Conemaugh group, Pennsylvanian system. The Glenshaw formation consists of cyclic sequences of sandstone, shale, red beds, and thin limestone and coal; several fossiliferous limestone; and Ames limestone bed at the top of the formation. The base of the Ames limestone is exposed in the emergency spillway cut approximately at Elevation 925 feet M.S.L. Above the Ames limestone on the valley walls is the Casselman formation of the Conemaugh group. This formation consists of cyclic sequences of sandstone, shale, red beds, and thin limestone and coal. Immediately below the Ames limestone is a unit known as the "Pittsburgh Red Beds" which consists of greenish-gray, red, and variegated clay shales. This unit has been known to cause landslide problems in the Pittsburgh Region.

The Pittsburgh coal was projected at approximate Elevation 1150 feet M.S.L. or 219 feet above the top of the dam. Subsequent to the site investigation and soil mechanics testing for this site by the SCS, strip mine spoil ranging in thickness from approximately 2 to 4 feet was spread over the borrow area on top of the left abutment. This mining activity and other strip mining activity in the watershed area were mining the Pittsburgh coal. (Note: from the information available it is estimated that this strip mine spoil was used as zone II material in the embankment.)

The left abutment of the dam was composed of thin to thick bedded, weathered, moderately soft, shaly siltstone. This abutment was nearly vertical originally and was cut back to 1H:1V during construction. The siltstone excavated was placed as a rockfill buttress on both the upstream and downstream slopes. On the right abutment, residual and colluvial soils overlie the weathered shaly and sandy siltstone. In the floodplain, alluvium of silty clay (CL) originally extended to a depth of 4.0 feet. Below the CL material was a clayey gravel (GC) to a depth of 9.0 feet. Blow counts in this material ranged from 6 to 7 blows per foot during the original drilling program. Below 7 feet to 29 feet is residual or colluvial sandy clay (CL) with strata of clayey gravel (GC). This material had blow counts ranging from 26 to 69 blows per foot. During construction of the dam the upper 9.0 feet of valley alluvium was removed prior to placing embankment material.

A regional geology map and legend are presented on the following pages. Additional site geology can be obtained by reviewing the "Detailed Geologic Investigation Report" in the SCS design folder for this dam.



AD-A088 778

BAKER (MICHAEL) JR INC BEAVER PA F/G 1 /13
NATIONAL DAM SAFETY PROGRAM. UNNAMED TRIBUTARY TO HARMON CREEK.--ETC(U)
JUL 80 J A DZIUBEK DACW31-80-C-0025
NL

UNCLASSIFIED

2
50
100



END

DATE

FORMED

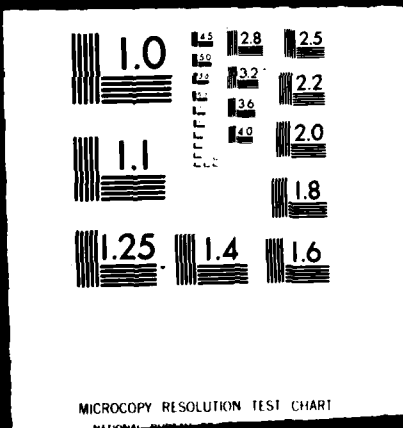
10-80

DTIC

OF

2

D A
088778



GEOLOGY MAP LEGEND

GROUP FORMATION

DESCRIPTION

Alluvium		Qt.	Sand, gravel, clay.
Terrace deposits			Sand, clay, gravel on terraces above present rivers; includes Carmichaels Formation.
DUNKARD	Greene		Cyclic sequences of sandstone, shale, red beds, thin limestones and coals.
	Washington	Pw	Cyclic sequences of sandstone, shale, limestone, and coal; contains Washington coal bed at base.
	Waynesburg		Cyclic sequences of sandstone, shale, limestone and coal; contains Waynesburg coal bed at base.
MONONGAHELA		Pm	Cyclic sequences of shale, limestone, sandstone and coal; contains Pittsburgh coal bed at base.
P: CONEMAUGH	Casselman	Pcc	Cyclic sequence of sandstone, shale, red beds and thin limestone and coal.
	Ames		
	Glenshaw	Pcg	Cyclic sequences of sandstone, shale, red beds and thin limestone and coal; several fossiliferous limestone; Ames limestone bed at top.
ALLEGHENY	Vanport	Pa	Cyclic sequences of shale, sandstone, limestone, and coal; contains Brookville coal at base and Upper Freeport coal at top; within group are the commercial Vanport limestone and Kittanning and Clarion coals.
		Pa	
POTTSVILLE			Sandstone and shale; contains some conglomerate and locally mineable coal.
Mauch Chunk			Red and green shale with some sandstone; contains Wymys Gap and Loyalhanna limestones.
Pocono			Sandstone and shale with Burgoon sandstone at top.